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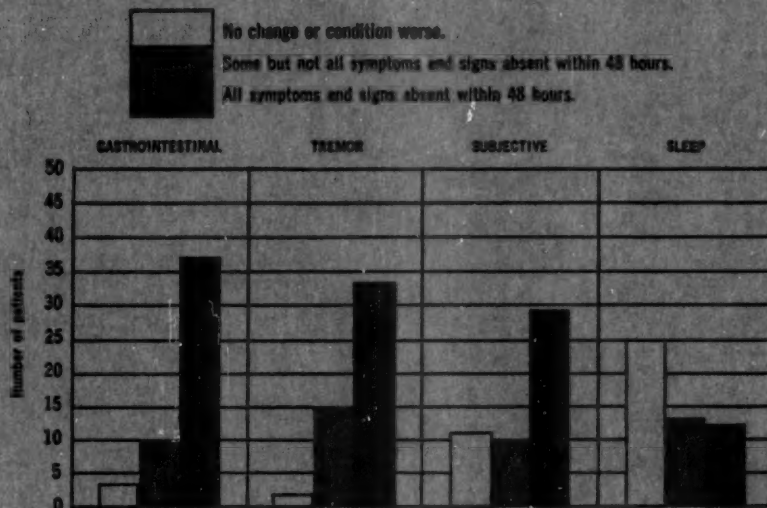
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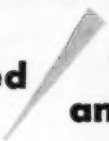
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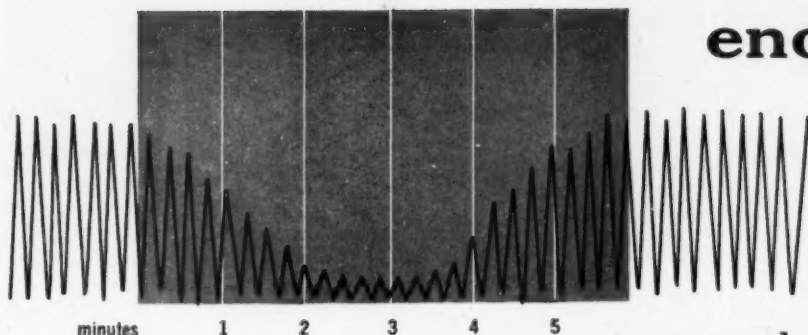
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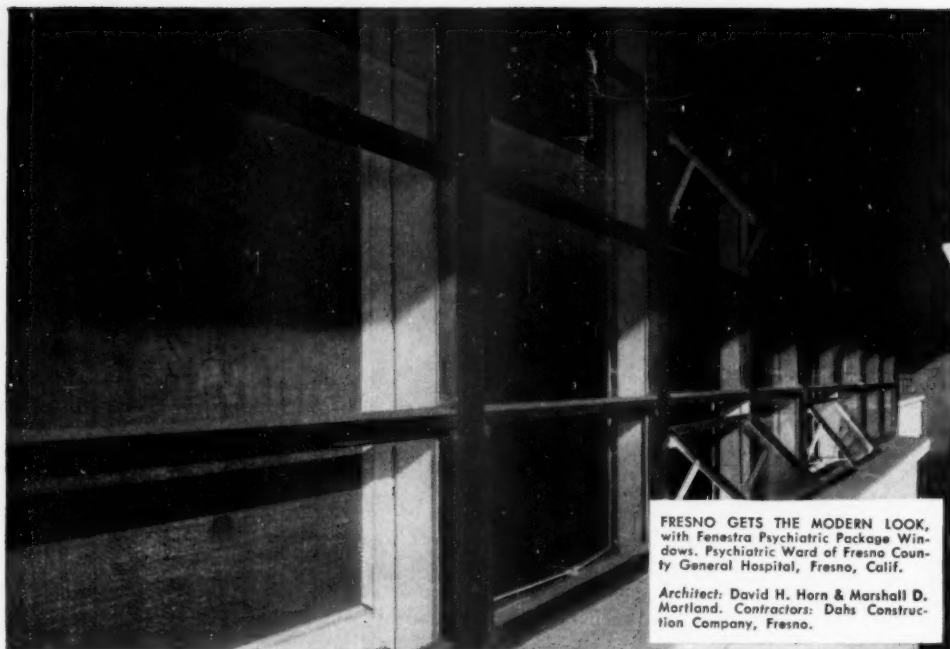
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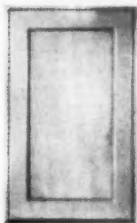
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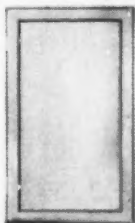
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MEMORY AS A BIOLOGICAL FUNCTION¹

ROLAND P. MACKAY, M.D., CHICAGO, ILL.

The prime duty of a biological psychiatrist is to consider mind and behavior from a broad, biological viewpoint. Specialization is intellectual provincialism unless special areas are surveyed in their larger relationships. The question of memory—at once the most crucial and difficult of psychological and physiological problems—is a perfect case in point. In the following discussion we shall seek some of the universal features of memory as a basic biological function, and go as far as we can in understanding its operation.

At the outset it is clear that human memory is but a special manifestation of a more *general biological retentiveness*, which is present in some form in every living thing. This retentiveness, this biological memory, is both sensory and motor. Each organism must retain throughout its life a selective sensitivity to those stimuli that are of significance to it, "distinguishing," if you will, between varying circumstances. It must, thus, have enduring patterns of receptivity, or sensory memories. It must also react appropriately, from day to day and from year to year, with enduring patterns of response, or motor memories. It is at once clear that patterns of receptivity and those of response are linked together as operative units, as sensorimotor memories, in the behavior of the organism.

Furthermore, memories, in this biological sense, may be inborn or acquired. In the simplest forms of life, without a nervous system, one may speak of *vegetative memory*, which is inborn. Even protozoa consistently distinguish between food and noxious agents. The ameba, for instance, responds regularly to food by approach, engulfment, and absorption, and to irritants by withdrawal. Thus, the ameba, so long as it lives, "remembers" distinctions essential to its life. Similarly, plants "remember" their tropisms—they are enduringly and selectively sensitive to light,

to water, to gravity, and respond appropriately. Witness the turning of the sunflower to the sun, or the opening of the morning-glory at the coming of day. Such inborn memories remain relatively unaltered by the experience of the individual. Among the least modifiable of inborn memories are those of insects. For hundreds of thousands of years bees, for example, have taken nectar and pollen from flowers, have built their hexagonal honey-combs, and have lived in a stereotyped social organization of extreme complexity. Some insects (*e.g.*, butterflies), exhibiting inborn sensorimotor memories of great complexity, transmit these patterns not only from one generation to the next, but through metamorphoses in which they lie dormant while entirely different behavior patterns operate. No discussion of memory can ignore these remarkable creatures who remember so much, so perfectly, and so unchangingly.

In those animals possessing a nervous system, not only are inborn memories more complex, but acquired patterns of receptivity and reaction are added to those that are inborn. Even bees must "learn" the geography of their individual fields and must go and come in their specific environment. Thus they acquire new sensorimotor memory patterns as elaborations of those inborn. The mating instincts of birds are certainly inborn, and tenaciously retained, but they are refined by acquired memories, since many are monogamous and must be said to remember their mates and their young. Consider also the remarkable acquired memories of carrier pigeons.

In the acquired memories of higher animals, such as man, we reach familiar ground. Inborn memory patterns exist here, too, from the sucking reflex of the babe to the sex instinct of the adult, but they are all richly elaborated and modified by acquired memories of enormous subtlety and complexity. Acquired memories are not only readily formed; they are fortunately easily lost with disuse, permitting a constantly precise ad-

¹ Presidential Address read before the Society of Biological Psychiatry, May 11, 1952, Atlantic City, N. J.

From the Department of Neurology and Neurological Surgery, University of Illinois College of Medicine, and St. Luke's Hospital, Chicago.

justment to a changing environment. In man, as in other biological organisms, both sensory and motor patterns cooperate in the complex whole. The verbal skills of the linguist, the dexterity of the violinist, with all the nuances of his "interpretation," and the grace and rhythm of the swimmer are all based on acquired sensorimotor patterns of memory.

THE PSYCHOLOGY OF MEMORY

The subjective aspects of memory afford indispensable aid to its study in man, and contribute much to a general neurologic theory of memory. Acquired memory is customarily said to involve 4 processes: (1) *impression*, (2) *retention*, (3) *recall*, and (4) *recognition*. To these I wish to add a fifth, *reaction*, as an integral part of the whole. The dynamic psychiatrists will forgive our indulgence in elementary classical psychology.

(1) *Impression* must be the primary event, but it is well to remember that the impression, when an object is first presented to an infant, is a meaningless flood of sensory items, of diverse modalities, leading to no perception. For example, a stick of red candy given for the first time to a child affords him a wealth of visual stimuli—color, brightness, shadows, bordering lines, and all in motion—and also a mass of thermal, tactile, and kinesthetic stimuli as he handles it, of auditory stimuli as he drops it, and additional tactile, olfactory, and gustatory stimuli as he places it in his mouth, to say nothing of the changes in his visceral sensations of hunger as he consumes it. Thus, even simple objects induce complicated, multimodal sensory experiences, the individual items of which always "hang together." Of crucial importance is the *affective tone* of some of the sensory modalities. Certainly the gustatory and visceral sensations convey strong affective tone—pleasurable to the child in the case of candy. This affective, pleasurable response would seem original and unlearned, an unconditioned reflex in Pavlov's terms, an inborn memory in psychological terms. With repetition, the affective tone is ultimately evoked by the other, associated modalities—even the sight of the candy becomes pleasurable. Thus, not only do the disparate sensory items in the experience

come to "hang together," but they all partake of the same affective tone.

(2) *Retention* has already become psychologically evident in the above discussion, since repeated stimulation with the object finds the child progressively altered subjectively. The nature of this retention is not evident to subjective observation, but certain features are at once quite obvious. (A) For any retention to occur an affective quality or tone must be present. Probably no sensory experience is totally devoid of affective tone, or "meaning" for the subject, or it would be completely disregarded. In general, strong affective tone, either pleasurable or painful, secures prolonged retention. The child never forgets the pleasurable sweetness of candy or the painful burning of fire. (B) The repetition necessary to secure retention is inversely proportional to the affective tone inhering in the experience. A single experience may suffice for learning if sufficiently vivid affectively. Experiences nearly neutral affectively (*e.g.*, nonsense syllables) require many repetitions, but such neutral experiences may be artificially invested with affectivity (*e.g.*, by a prize offered), and so be learned quickly. (C) Some sensory modalities of stimulation—especially the visual and auditory—lead to retention of impression more readily than others, but there are individual variations in this regard. Some persons, for reasons not known, retain visual impressions best, others auditory. Kinesthetic and equilibratory sensations are strongly retained, olfactory sensations only weakly.

Repeated impressions are not retained as exact duplications of their originals, but as summations or abstractions of them all. These are called *concepts*, in the construction of which the several sensory modalities partake in rough proportion to their original contribution to the impressions. The participation of multiple sensory modalities in the formation of a concept is its most important feature. For example, my concept of "hat" includes visual images of hats of all sizes, shapes, and color, as well as tactile, thermal, and proprioceptive images of hats I have worn or held in my hands, not to mention the olfactory images of hats wet with rain or sweat. Some concepts are specific, and but slightly abstracted, such as the concept of

a memorized poem. But even here the memorized poem is a composite of auditory and visual images of the words, kinesthetic images of the recitation of the poem, as well as the evoked imagery of the thought and meaning of the poem's content. Every concept retains its own composite emotional or affective tone, which is rarely pure, being rather a mixture of pleasurable or unpleasurable elements. (Neurotic conflicts are based on concepts with opposite or incompatible affective tones—*e.g.*, for a daughter, the concept "mother" may have irreconcilably opposite emotional components, leading to grossly disturbed behavior.)

Concepts are infinitely complex and are arranged in a hierarchy of categories—a structure of groups and subgroups. For example, my concept of "hat" is a subgroup of a larger concept of "clothing," and has its own subgroups of "men's hats," "women's hats," "felt hats," "straw hats," or what-not. The emotional or affective tone varies between these categories, and determines the type of hats I buy or do not buy, like or do not like on others.

(3) *Recall* is the evocation of concepts. It will be remembered that concepts are abstractions of numerous multimodal sensory experiences. The elements, even of diverse modality, composing a concept may be said to have access to each other—they "hang together," as did the many items in their sensory originals. A concept may be evoked by a new sensory experience related to it by some species of similarity, dissimilarity, or contiguity. For example, I encounter a man on the street whose form, facial coloring, voice, and movements are so similar to those items in my concept of my friend, "A," that that concept is recalled. The similarity in some cases may be indeed tenuous, consisting merely of the shape of the nose, or a unique trick of gait. Furthermore, the sound of my friend "A's" voice on the telephone wakes not only my auditory concept of his voice, but also my visual concept of his face, and my kinesthetic concept of his handshake. Thus a whole concept "hangs together" and may be dragged into recall by a single item of concurrency or connection in the new experience. A concept may be evoked also by another concept with which it was originally

associated in time or space, and may, in turn, evoke still others by *association*. Thus a whole train of evoked or recalled concepts may flow in sequence, one after the other, independently of any new sensory experience, and linked only by their mutual association. Such sequences of concepts may flow in either direction, and any concept may be evoked in many different sequences. A recalled or evoked concept is called an image or idea, and a flowing series of images, each bound by association to its successor, is a species of thinking called *imagination* or *ideation*. In each recall, however achieved, the affective tone comes tumbling in, never to be separated from its parent image.

The process of recall, either in new experiences or in imagination, is shaped or governed largely by the affective tone imposed by the total situation and by the previous experiences of the individual. For example, the train of ideation initiated by the sound of a policeman's whistle will vary widely depending on what the hearer is doing at the moment, and what his previous experiences with policemen's whistles has been. A still better example is the widely variant ideational train initiated by the sight of a nude woman, depending on whether the physician observing her is conducting a physical examination or indulging in amorous exercises.

(4) *Recognition* is a purely affective process, and consists of a *feeling of familiarity* when a new sensory impression corresponds to the evoked conceptual image. For example, when the observed characteristics of the man I encounter prove congruent with those of my evoked concept of my acquaintance, "A," I "recognize" that man as "A," and the process of recognition is the affective feeling of familiarity. This feeling of familiarity is not to be confused with the additional emotional response to "A," which will depend entirely upon my pre-established emotional attitudes to "A"—whether those of friendship, hostility, envy, fear, or what-not.

It is to be noted that with the establishment of recognition, which we have seen is an affective feeling of familiarity, memory ceases to be a purely passive, or sensory, process and takes on the character of an active response, particularly since with the feeling of familiarity comes an additional emotional at-

titude toward the concept evoked and the thing recognized. This emotional process (recognition plus affective attitude) alone lends meaning or significance to the experience—the process known as *apperception*—and constitutes, in physiological terms, the visceral response.

(5) *Reaction*. The orthodox consideration of the psychology of memory customarily ends with recognition. It seems correct, however, to append *reaction* as the fifth and final process. This reaction consists not only of the emotional attitude or visceral response, but also of the extrinsic motor response of the organism, and for purposes of physiological analysis completes the whole process. For, as we have seen, there are motor memories no less inescapable than sensory. Having recognized a presenting situation, with the evoked emotional attitude, the organism responds actively in accord with that attitude. Thus, retained patterns of receptivity and response, in man as in insect, operate as a unit of behavior. But the response is never quite the same in all its kinetic detail, even assuming hypothetically an identity of circumstances.

An example will make clear this highly important point. A shortstop, in accord with his acquired motor habit, and with a wealth of kinetic detail, races forward, scoops up a bounding ball, and throws out the runner at first base. This complicated motor response, with its intricate visual, kinesthetic, and equilibratory controls, and its fantastic operational synergy and coordination of thousands of motor units cannot conceivably be absolutely identical in all its details on any 2 occasions, no matter how similar the conditions. And yet the fielding of a batted ground-ball by the shortstop, followed by the hurried throwing of it to the first baseman, is a well-learned act-in-sequence, constituting a quite precise motor habit. Similarly, every inscribing of one's signature, every playing of a familiar selection on a violin by a skilled musician, and every riding of a bicycle down a quiet lane is an individual and unique expression of its own generalized motor pattern.

Thus, the learned motor habit, or pattern of reaction to a given situation, is a generalization, or abstraction, for which I should like

to coin the term *kinemnesis*,² or motor memory, built up as a summation of innumerable previous performances of the act. The kinemnesis is the motor homologue of the sensory concept, and each act performed in that pattern is a single particularized expression of its kinemnesis, just as each perception is a particularized contribution to its concept.

The character of an individual—his enduring patterns of conceptual and kinemnesic interaction with the complexities of life—is the sum of his ideational and motor memories, inborn and acquired. Without this broad, inclusive memory function, he would have no character—no capacity to perceive and behave in any consistent fashion. He would be as characterless as the new-born babe. In the operation of this memory function, the affective or emotional elements in lending value and significance to the sensory inflow, and in imparting a discriminating dynamic to the motor output, are immediately obvious. The structure and consistency of character depend, in the ultimate analysis, on these affective functions.

THE ORGANIC BASIS OF MEMORY

Any inclusive discussion of the organic basis of memory would require more time than we have at our disposal, and much more knowledge than we have yet acquired. The vegetative memory of protozoa and other primitive forms, and the persistent and predictable behavior of plants must, we may assume, depend upon physicochemical reactions. This does not tell us much, except that memory at this level must reside in the molecular structure of some elements of protoplasm. The species-specificity of these reactions and their transmission through thousands of generations suggest that their physical basis must be carried by the genes, just as morphologic continuity is so carried. The fact that such simple retained patterns of behavior represent "only tropisms" does not diminish their importance in a holistic concept of memory. We shall not "understand" memory in its more complex manifestations until we know more of these basic processes in lower forms.

Behavioral memory in animals possessing

² (Greek: *κίνησις*, movement, + *μνήμων*, memory.)

nervous systems is infinitely more complex, and hence more difficult to analyze, but its very complexity offers us the opportunity to say much more about it and perhaps to clarify our thinking about memory in man.

The distinction between inborn and acquired memories involves only their origin. Inborn memories are not established in the individual; they are transmitted, it must be, in the genes, and their original establishment must have occurred in the distant past, when they arose as a mutation, or in some fashion we cannot imagine. Once established, inborn memories, or patterns of behavior, must function in much the same way as do acquired memories. If we may turn again to the insects, the bee can only be imagined to carry somewhere in his nervous system a set of generalized sensory abstractions comparable to our human "concepts," by reference to which he "recognizes" flowers, "chooses" suitable locations for the establishment of his hive—be it in hollow tree or human contrivance—and "selects" the conditions suitable for his operations. Such a bee must also carry in his nervous system a complex set of generalized motor abstractions, comparable to our human "kinemneses," by the operation of which he builds his hexagonal comb, flies his paths to and fro, and manufactures his honey for a complicated apian society.

The higher animal, such as man, possesses in the same way his generalized sensory abstractions or concepts, by congruence with which incoming constellations of stimuli are recognized, or perceived, and his equally generalized motor abstractions, or kinemneses, by the activation of which he responds skilfully to the perceived sensory inflow. These concepts and kinemneses are, however, in man, largely acquired; they are "conditioned" or learned responses. They operate, from sensory input to motor output, exactly as do the inborn responses, but they are more variable and plastic. The dynamic drive of these retained patterns of response is affective or emotional; the affective "feeling of familiarity" that constitutes recognition at once evokes the more definitive affective attitude to the perceived situation, and this emotional attitude activates the retained kinemneses, which, under the constant control of kinesthetic, equilibratory, visual

checks and facilitations, sets the pattern for the motor response.

With the information at our disposal no very satisfying neurologic theory is possible as to how this process is set up and operated. The simplest examples may help us, however. Selecting for convenience a visual stimulus, let us assume that an individual is presented for the first time with a triangle. A triangular pattern is thereby projected upon the retina, stimulating rods and cones in a triangular topographic arrangement, which is transmitted to the thalamus and eventually to the visual cortex. Since subsequently presented triangles of varying sizes and shapes will stimulate different rods and cones, and ultimately different cortical neurones, it is obvious that no individual rods and cones, and no individual nerve fibers or thalamic or cortical neurones, can be reserved for the reception of triangles, and that, in fact, a triangle may be seen by any conceivable triangular grouping of rods, cones, and neurones. Further, upon the presentation of a triangle, the visual fixation point is invariably moved along the outline of the figure, thus adding to the sensory inflow kinesthetic impulses from the ocular muscles, neck muscles, or even semicircular canals if the triangle is large enough. (Similarly, a blind man palpating a metal triangle or traversing a triangular city block.) These kinesthetic impulses are at once transmitted through the thalamus to the postcentral gyrus, but, as in the case of the visual sensory elements, no single combination of sensory end-organs, neurones, or fibers is involved in the viewing of all triangles. When, then, enough triangles, of whatever size and shape, have been presented to a subject, and he forms a concept of triangularity, that concept must be retained in the nervous system, not at any specific neural synapses, but must inhere in a topographically oriented constellation of visual neuronal activity, which is characteristic of triangularity, no matter which neurones are activated, plus a sequential series of kinesthetic neuronal stimulations equally characteristic of triangularity, and therefore resides not in specific pathways—not precisely *anywhere*—but rather in a characteristic topographic (spatial) and sequential (temporal) order of activity of any visual,

kinesthetic, and vestibular neurones whatever.

It has been seen, in our discussion of the psychology of concepts, that recognition, without which no concept can be operative, is an affective state of familiarity. Neurologically, this can only mean that, upon the presentation of a triangle to an individual who already has a concept of triangularity, the induced characteristic topographic and sequential order of neuronal activity has access to those centers in the diencephalon concerned with affective states. So recognition occurs. If the subject be required to name the figure presented, transcortical pathways must be activated by the diencephalic centers, and must feed into the motor cortex, including cerebellar and other contributory motor structures, so that the word "triangle" is spoken. It is this motor response that contributes specificity to the recognition.

In a similar fashion, auditory presentation of a musical air, played in whatever key, on whatever end of the chromatic scale, by instruments of whatever timbre, establishes a memory or concept of that air, not by the activity of any specific fibers in the organ of Corti or their projections, but by representing a certain topographic and sequential order of activity in any auditory receptive units whatever. It is the *order* of neuronal activity that denominates the concept, not certain facilitated pathways. Such an order in the auditory sensory cortex (perhaps reinforced by kinesthetic impulses in a similarly characteristic order, from the muscles of vocalization used in singing the air, or in whistling it) is alone able to evoke activity in the diencephalic centers to mediate the affective state of recognition, and so, through transcortical pathways, activate the motor response of singing, whistling, or dancing to the air.

These visual and auditory examples are very simple. Most concepts are more complex and, importantly, involve many sensory modalities; they are synesthetic. For a more involved example, I may meet a man on the street, the topographic order of whose visual appearance—no matter on which rods and cones of my retinae his image falls—corresponds to the topographic order of my concept of my friend "A." But if the sequential order of his gait or of the sound of his voice

—no matter which specific neurones may be stimulated—does not correspond to the order of my concept the entire synesthetic combination is incoherent. In that case, a different diencephalic pattern of stimulation is evoked, characteristic of unfamiliarity, rather than of familiarity, and I reject him as not being my friend "A." On the other hand, all the topographic and sequential order of his visual and auditory appearance is congruent with those of a larger concept of mine, namely the concept of a male human being—in fact, a white male human being of a certain age. Such congruence with the larger concept evokes a diencephalic activity corresponding to a feeling of less notable familiarity, and I recognize the stranger as a white man of a certain age, etc.

One may legitimately ask what the neurophysiologic basis of the concept is, given that it resides in a topographic and sequential order of neuronal activity. The nervous system is a collection of a fantastic number of neurones with their connecting fibers. If a concept depends upon a certain spatial and temporal order of neuronal activity it resides not in any neurones as such. We may say, however, that a certain topographic arrangement of neurones, firing in a certain pattern of simultaneity and sequence, comes with repetition to have such an internally reinforcing intensity of activity that it gains access to the "emotional centers" of the diencephalon and evokes recognition. This effect could be achieved by summation in reverberating neurone circuits, controlled by "feedback" connections. Such circuits need reverberate only so long as the single act of recall; they could not conceivably reverberate perpetually as the seat of a particular memory. The concept is thus not anywhere; it lies as an abstraction, in a pattern of activity that has a specific access to the diencephalon. In the same way, it is improper to ask where, in a piano, is to be found Tchaikovsky's "Waltz of the Flowers." It is not anywhere in the piano—it comes out of the piano only when a topographic and sequential order is followed in striking the keys. One may even impair the melody by destroying some of the keys, but the pianist may then move to another portion of the keyboard, or change the key in which he plays.

One must say something about the kinemesis or motor memory. Again, an example is much easier to comprehend than abstract descriptions. One has a motor memory, say, for walking down the street. This kinemesis can only be activated by the diencephalic affective centers—in plain English, one must “want” to walk down the street for some purpose or other, conscious or unconscious. This diencephalic command, “walk!”, sets motor cortical neurones in action in a topographic and sequential order characteristic of the kinemesis for walking. Then, controlling impulses flow in from proprioceptive, vestibular, visual, and—if our subject marches in time with a band—from auditory end-organs, over all appropriate paths and through all appropriate thalamic, cortical, subcortical, or cerebellar areas, and play upon the motor internuncial pool in a perfect continuum of correction, reporting at each instant upon the progress of the subject. In this way, the abstract kinemesis is particularized in a specific sequence of muscular contractions that constitutes the walk actually performed. Thus, the total kinemesis, or motor memory, like the sensory memory of triangularity, can reside in no precise neurones or synapses, but inheres in a topographic and sequential *order* of activity in neurones scattered widely throughout the nervous system.

This paper, already too long, cannot touch upon many ancillary questions, the answers to which must be left for later reflection. A few comments seem, however, necessary.

Memory is a universal biologic function, indispensable to all consistent behavior. In animals with a nervous system, as we have seen, it cannot be said to reside in any restricted part of the brain or spinal cord. My memory of my vacation of last summer is so complex a matter, involving a cooperative effort of my entire nervous system, with the participation of those areas mediating every modality of sensation, every species of motor reaction, every shade of affective attitude and subjective evaluation, that one could locate it in no part. Studies of Penfield(1) suggesting a “memory cortex” in the temporal lobes are exceedingly stimulating, but, I think, misleading. What Penfield did was to stimulate the temporal lobe and cause the

subject to have a visual or auditory hallucination evoking a feeling of familiarity. This is nothing new—tumors of the temporal lobe do the same, as do vascular changes. His observation that he could not produce comparable effects by stimulating other cortical areas is interesting, but leaves one wondering what other parameters of stimulation might accomplish. Certainly, Penfield’s observations in no sense justify locating memory in the temporal lobes, or, as we have shown, in any precise *place* in the nervous system. As Herrick has said: “And to speak of memories or any other unitary cortical functions as localized in some particular cells, or in some small cortical areas is to talk neurologic nonsense”(2). Certainly, one may impair memory by destroying parts of the brain, as one may impair a melody by destroying parts of a piano, or one may evoke memory fragments by stimulating parts of the brain, as one may evoke fragments of a melody by “stimulating” parts of a piano, but no question is thereby answered as to the location of memory in the brain, or of a melody in a piano.

Similar objections may be raised to endowing the diencephalon with a “highest level” position in the neurologic hierarchy. The diencephalon functions in behavior as a center for affective response—it is the head of the visceral nervous mechanisms. Since the affective elements in behavior are the dynamic elements—without emotional evaluations there would be no desire, no revulsion, no drive of any sort—and since recent work by Magoun(3) and others has shown the activating function of the gray centers of the diencephalon, it appears that these centers are the dynamic reservoir for behavior, but in no sense a discriminating reservoir. We have seen that sensory inflow gains access to this reservoir when the inflow assumes a spatial and temporal order agreeing with that of previous experience as generalized in concepts; we have seen that the emotional diencephalic centers furnish drive for behavior patterns already decided upon; but the diencephalic activator centers exercise no more determinative control over the behavior of the organism than the tank of gasoline exercises over the course followed by a motor car.

Finally, no discussion of memory and its supreme role in behavior can omit mention

of the recent work in cybernetics(4). This work is of transcending importance; it has shown a way to understanding much of neurologic function, with its concepts of reverberating circuits, feedback mechanisms, etc. We are astonished at the achievements in constructing computing machines that can "remember" what they are "told," can furnish the answers to numbers of complicated mathematical problems simultaneously, and we are grateful for the analogy to the operations of the nervous system. But one's enthusiasm for these "imitations" of the human brain is tempered by our familiarity with the superb adaptive, compensatory mechanisms of the nervous system, with the "creative" synthesizing capacities of the human mind, which can even devise an electric brain, and with the remarkable phenomena of human neuroses. One wonders whether an electronic computing machine ever has a symbolic neurosis, and if so, how. And at best, the computing machine still needs a man to operate, service, and repair it. It is thus not entirely automatic. Perhaps one can say it can be "taught," but can not "learn" from raw experience. Instructive though the electronic computing machine is, it is only an analogy to the nervous system, which does much more than the machine, both quantitatively and qualitatively. Thinking by analogy is dangerous in science, and we had best not draw too many conclusions from even the most remarkable of these machines.

CONCLUSIONS

From these reflections it appears that memory is a basic attribute of all living things, by which patterns of sensitivity and response, both inborn and acquired, are retained and progressively modified under the

impact of experience. Memory is thus indispensable in all behavior, making it at once consistent and modifiable. A consideration of some of the classical psychologic features of memory indicates the extent to which it involves multimodal processes and hence extremely widespread cerebral areas. In the higher animals and in man therefore, memory can have no precise localization and thus cannot be said to "reside" in the temporal lobe or in any other restricted area. In the simplest organisms memory seems to be dependent upon modifiable molecular structure; its mechanism in a nervous system is a most elusive function of neuronal networks by which topographic and sequential patterns of stimuli sensitize the network to subsequent stimuli in the same patterns, probably through the device of summation in reverberating circuits rather than by the facilitation of anatomical pathways. Sketchy and hypothetical though our present knowledge is, this dynamic approach to the physiology of memory promises much for our understanding of the behavior of living things.

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SOCIAL STRUCTURE AND PSYCHIATRIC DISORDERS¹

F. C. REDLICH, M.D., A. B. HOLLINGSHEAD, PH.D., B. H. ROBERTS, M.D.,
H. A. ROBINSON, PH.D., L. Z. FREEDMAN, M.D., J. K. MYERS, PH.D.

NEW HAVEN, CONN.

This is a preliminary report of a research project² dealing with the relationship of social structure to psychiatric disorder.

The primary assumption was the existence of a significant relationship between social status position and psychiatric disorders. More specifically, our main hypotheses were that (1) the prevalence of psychiatric disorders is significantly related to the social status position of the patients; (2) (diagnostic) types of disorders in psychiatric patients are significantly related to social status position; (3) types of psychiatric treatment are significantly related to social status position of the patients; (4) the psychodynamics of behavior disorders are related significantly to social status position; and (5) social mobility in the status structure is related to psychiatric disorder. These interlocking (and to some extent interdependent) hypotheses involve examinations of the relationship of psychiatric disorders and the social stratification of the community.

Our knowledge of social stratification rests on the investigations of Warner and associates (14), Hollingshead (6, 7), and others. No psychiatric literature on our topic exists, with the exception of Ruesch's (12, 13) contributions, Dollard and Miller's (2) recognition of the problem, and casual references, amongst others by S. Freud, of the importance of social class for psychiatric etiology and phenomenology. Also, various epidemio-

logical studies by Faris and Dunham (4), Lemkau (10), Malzberg (11), Dayton (1), and Hyde (8, 9) relate single socio-economic criteria to the incidence of psychiatric disorders. The scheme of social stratification used in our study is that of Hollingshead. His Index of Social Position utilizes 3 factors: (1) occupation, (2) education, and (3) ecological area of residence. Each factor is scaled and assigned a weight determined by a standard regression equation. The combined scores group themselves into 5 clusters (social strata or levels) and to each of these a numerical index is assigned. A brief and general descriptive characterization of each of these social levels follows:

LEVEL I—(the highest socio-economic position) comprises families of wealth, education, and top-rank social prestige.

LEVEL II—consists of families in which the adults for the most part hold college or advanced degrees, and are in professional or high-level managerial positions.

LEVEL III—includes proprietors, the bulk of small business people, white-collar, and skilled workers; this group consists predominantly of high school graduates.

LEVEL IV—consists largely of semi-skilled workers and laborers, with an educational index below the secondary level.

LEVEL V—includes unskilled and semi-skilled workers, who have an elementary education or less, and who live in the poorest areas of the community.

The project is being carried out in the metropolitan area of New Haven, Connecticut. It consists of 4 successive studies: (1) a census of psychiatric patients herein referred to as the Psychiatric Census; (2) the social stratification of a 5% random sample of families in the same area; (3) a case study consisting of the comparison of a group of neurotic and psychotic patients belonging to social levels III and V; and (4) an intensive study of the psychodynamics of a few cases belonging to different social levels. The current report deals with experiences and results obtained in the Psychiatric Census, and the 5% sample of controls.

The Psychiatric Census was limited to residents of the New Haven metropolitan

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² In the spring of 1949, Redlich, Hollingshead, and Gruenberg made plans to investigate this problem. Gruenberg moved to another community and Hollingshead and Redlich then formulated the project. The following investigators were added to the research team: B. H. Roberts, L. Z. Freedman, psychiatrists; J. K. Myers, sociologist; H. A. Robinson, psychologist; and W. Caudill, anthropologist, who participated in the early phases of the investigation.

area with a population of about 250,000 in 1950. A systematic attempt was made to isolate and to acquire data for all individuals legally residing in this area who were psychiatric patients on December 1, 1950. A psychiatric patient is defined by us as a person in professional contact with a psychiatrist; i.e., a person who is seeing and/or obtaining help and care from a psychiatrist, regardless of whether this contact is for diagnostic or therapeutic purposes, whether it is voluntary or obligatory. The research team obtained the cooperation of all public and private psychiatric institutions and clinics in Connecticut and nearby states, and of all private psychiatric practitioners in Connecticut and in the metropolitan New York area. In addition, contact was made with well-known clinics throughout the country. The response was highly gratifying; all institutions and clinics cooperated, as did over 95% of the private practitioners. It can reasonably be assumed, then, that a very high proportion of the total sample of psychiatric patients was obtained.

At this point we would like to emphasize strongly—to avoid any errors of interpretation—that this study is not dealing with psychiatric disorders prevailing in the population at large. It is merely a sample—and nearly a total sample—of the population of psychiatric patients *according to our definition*. In other words, we are primarily exploring the relationship of social structure to certain aspects of current psychiatric practice. In the general population, clearly, there are many persons with psychiatric problems who are seeking help in other ways and, unfortunately, many who are without the benefit of any therapeutic intervention. To date, the true prevalence and incidence of psychiatric disorders in the general population is unknown. As such knowledge would be of utmost importance for both psychiatry and public health, we strongly favor such a study. In light of the results from such a study, many data of our own study would become more meaningful.

For every patient in the New Haven area, the research team of psychiatrists and sociologists obtained information on 44 items relating to their social status and psychiatric condition—sociologists worked on sociological items, while psychiatrists independently

gathered psychiatric data. These items had been carefully defined and organized into a schedule. Case records were relied upon for institutional and clinic patients; data on private patients were obtained by interview with the psychiatrist. Records of 1,589 institutional and clinic patients were abstracted and 374 private practitioners' cases were obtained by interview, for a total sample of 1,963 cases. After the field work was completed, the schedules were edited, coded, and the data punched on I.B.M. cards for analysis.

The census data comprise psychiatric symptomatology and diagnosis; duration and onset of illness; referral to the practitioner and institution; nature and intensity of treatment; as well as sociological data, such as occupation, education, ethnicity of patient, religion, parents, siblings, children, and spouse. Our diagnostic classification is based on the Veterans Administration nomenclature; the number of categories in this scheme was somewhat reduced to eliminate classifications that were poorly defined, or in this population were not found in statistically significant numbers. The diagnoses were based on data from family and personal history, behavior status, and course of illness. By doing this a uniform diagnostic approach was ensured and the error of accepting diagnoses depending on the viewpoint of the individual institutions and practitioners was avoided. Ninety-five percent of our own diagnoses were identical with the diagnosis of the psychiatric record. The reliability of our data-gathering technique was independently tested and found to be adequate.

BRIEF SURVEY OF FINDINGS

Before dealing with the principal hypotheses, a brief over-all survey of the census data is given. Of the 1,963 cases of the census study, 50.7% were males, 49.3% were females. The diagnostic distribution of the total group is presented in Table 1, and the age distribution in Table 2.

The low percentage of children and adolescents in contact with psychiatrists is remarkable. New Haven has 2 child psychiatric clinics and a comparatively high number of private practitioners of psychiatry—a number of them working with children, though none exclusively. The low percentage

of patients under 18 years of age may relate, among other possible factors, (1) to the difficulties that practitioners have in finding parents who can afford psychiatric treatment for their children, or to the unwillingness of parents to support long-term treatment, (2) to the general policy of child psychiatric clinics to favor long-term intensive treatment by a therapeutic team (psychiatrist, psychologist, and social worker) of a relatively small number of cases, (3) to the number of behavior disorders being treated by pediatricians, family doctors, and social agencies.

TABLE 1

PRINCIPAL DIAGNOSTIC GROUPS AND THE PERCENTAGE OF CASES IN EACH GROUP

Diagnosis	%
Psychoneurotic disorders	23.5
Intoxications and addictions	4.7
Schizophrenic and paranoid disorders	44.2
Affective disorders	8.0
Mental deficiency with psychotic disorder*	4.6
Arteriosclerotic and senile disorders	9.3
Convulsive disorders	1.9
Organic disorders other than arteriosclerotic and senile	3.6

* Mental deficiency without psychosis is not considered in this study.

TABLE 2

PERCENTAGE DISTRIBUTION OF PSYCHIATRIC CASES BY AGE GROUP

Age	%
2-18	4.6
19-24	5.1
25-39	29.8
40-54	24.9
55-69	22.5
70 plus	12.8

Table 3 presents the distribution of these patients among the various types of treatment agencies, and Table 4 lists the various types of treatment used with this population.

The "no treatment" classification refers almost exclusively to chronic hospitalized patients who receive care, medical attention, but no systematic, active, or sustained treatment. The small percentage of patients either in psychoanalysis or intensive psychotherapy is of considerable interest, numbering but 5% of the total patient population.

From the many data collected in this study, we shall present here only a few significant findings that bear upon hypotheses 1, 2, and 3, dealing with the relationship of prevalence,

diagnosis, and treatment to social levels. Our first hypothesis—stating that incidence of psychiatric disorders is significantly related to the social status position of the patients—may be tested by comparing the normal sample with the psychiatric sample in terms of social levels. Table 5 presents these data. It should be noted that in this and in the following comparisons, social levels I and II have been combined because of the paucity of cases ($N=19$) in level I of the psychiatric sample.

TABLE 3

PERCENTAGE DISTRIBUTION OF PATIENTS BY TREATMENT AGENCY

	%
State hospitals	66.8
Veterans' hospitals	4.2
Private hospitals	1.9
Clinics	8.1
Private practitioners' cases	19.0

TABLE 4

PERCENTAGE DISTRIBUTION OF PATIENTS BY PRINCIPAL TYPE OF TREATMENT

Principal type of treatment	%
Psychotherapy	32.0
Psychoanalysis	1.1
Analytic psychotherapy	3.8
Eclectic methods	6.0
Supportive methods	7.1
Suggestive and directive methods	6.9
Group psychotherapy	6.6
Other types of psychotherapy	.5
Organic	31.7
Electric convulsive treatment	18.7
Insulin and other	1.5
Drugs	4.3
Lobotomy	6.2
Other organic treatment	1.0
No treatment	36.3

These data show a very significant relation between social level and the prevalence of psychiatric patients according to our definition in the population of the New Haven community. With respect to the normal population, the relative number of psychiatric patients is found to be somewhat lower in the first 4 social levels, and considerably higher in level V. On the basis of these data, hypothesis 1 may be considered tenable.

Our second hypothesis postulates a significant relationship between the type of psy-

chiatric disorder in the patient population and social level. In analyzing our data, we have employed 10 diagnostic groupings or categories; here, for the sake of brevity and to suggest a basic preliminary finding, we present a table that dichotomizes neurosis and psychosis by social level.

Table 6 reveals a marked inverse relationship between the incidence of neuroses and psychoses by social level. Neuroses show a relatively high incidence in the higher social levels and a remarkably low incidence in social levels IV and V. The reverse is true for the psychoses. It may be assumed that the low percentage of neurotics in the lower levels of our patient population is due to socio-economic conditions of current psychiatric practice. The high number of psy-

chotic will be 100. If the prevalence is disproportionately high, the Index is above 100. Table 7 presents these data.

The social level differences in the incidence of schizophrenia, with the systematic increases in the prevalence of this diagnosis as one progresses from level I to level V, are very striking, and strongly suggest the validity of our second hypothesis. The fact that the Index of Prevalence in social level V is 9 times as great as in combined social levels I and II is a remarkable finding. Its signifi-

TABLE 5

DISTRIBUTION OF CONTROL AND PSYCHIATRIC POPULATIONS BY SOCIAL LEVEL

Social level	Normal Population		Psychiatric Population	
	No.	%	No.	%
I and II	1,284	11.3	150	7.9
III	2,500	22.0	260	13.3
IV	5,256	46.0	758	38.6
V	2,037	17.8	723	36.8
Unknown*	345	3.0	72	3.7

$$\chi^2 = 281.0$$

$$p < .001$$

* The cases whose social level could not be determined, because of paucity of data, are not used in the calculation of χ^2 .

chotics cannot be explained at present. It actually may indicate an uneven distribution of psychotics in the total population.

The schizophrenics, who comprise 44.2% of the patient population, and well over half (58.7%) of the psychotic group, are the largest diagnostic group in our sample. The schizophrenics are distributed among the social levels in a distorted fashion ($p < .001$); that is, there is a strong relationship between social level and the incidence of schizophrenia in our data. To indicate clearly the strength and direction of this distortion, Hollingshead constructed an Index of Prevalence, which at each social level represents differences between the potential (expected) number of schizophrenics in the normal population and the diagnosed schizophrenics in the Psychiatric Census. In this scheme, if a social level exhibits the same proportion of schizophrenia as it comprises of the general population, the

TABLE 6

DISTRIBUTION OF NEUROSES AND PSYCHOSES BY SOCIAL LEVEL (PSYCHIATRIC CENSUS)

Social level	Neuroses		Psychoses	
	No.	%	No.	%
I and II	98	65.3	52	34.7
III	115	44.2	145	55.8
IV	175	23.1	583	76.9
V	61	8.4	662	91.6

Total 449

1,442

$$\chi^2 = 297.8$$

$$p < .001$$

TABLE 7

INDEX OF PREVALENCE FOR SCHIZOPHRENIA BY SOCIAL LEVEL

Social level	Normal sample		Schizophrenia		Index of Prevalence
	No.	%	No.	%	
I and II	1,284	11.6	29	3.4	28
III	2,500	22.6	83	9.8	43
IV	5,256	47.4	352	41.6	88
V	2,037	18.4	383	45.2	253
Total..	11,077		847		

cance will be explored by detailed internal analysis of our data in later publications. It is possible, for example, that the higher marital and family instability at the lower social levels will relate to this finding. It is equally possible that this phenomenon may be, in part, a function of the larger proportional incidence of chronic cases in the lower social levels. It may be largely caused by existing conditions of psychiatric practice in which upper-level schizophrenics get cured and discontinue contact with psychiatry; while the lower-level patients with "no home" to go to and less adequate treatment become "chronic" in public mental hospitals. Further analysis of our data and future research on incidence

and prevalence of schizophrenia in the general population may answer these questions.

Summary data on our third hypothesis, that a significant relationship obtains between type of psychiatric treatment and social level, are demonstrated in Table 8.

The treatment differences between the social levels is striking and statistically significant ($p < .001$). There is a distinct progression in the percentage of cases who received no treatment (cases in custodial care) as one moves from the higher to the lower levels. Likewise, the percentage of cases receiving some form of organic treatment as the prin-

TABLE 8

PERCENTAGE DISTRIBUTION OF THE PRINCIPAL FORM OF THERAPY BY SOCIAL LEVELS

Type of treatment	Social level			
	I & II	III	IV	V
Psychotherapy	79.1	52.7	31.1	16.1
Organic	11.8	28.7	37.1	32.7
No treatment	9.1	18.6	31.8	51.2

TABLE 9

PERCENTAGE DISTRIBUTION OF PATIENTS BY SOCIAL LEVEL AND TREATMENT AGENCY

	Social level			
	I & II	III	IV	V
State hospitals	14.0	41.9	68.5	84.5
Veterans' hospitals ..	2.6	3.1	3.8	5.5
Private hospitals ...	14.7	3.1	.9	.0
Clinics	5.3	12.3	7.9	7.2
Private practitioners' cases	63.3	39.6	18.9	2.8

$$\chi^2 = 871.1$$

$$p < .001$$

cipal form of therapy tends to increase as one descends from level I and II to the lower levels. In distinction to this, the percentage of patients who receive some form of psychotherapy systematically decreases as one moves from the higher to the lower social levels. Within this latter group (patients receiving some form of psychotherapy) we find marked differences between the types of psychotherapy administered to patients at the several social levels; psychoanalysis, for example, is limited to levels I and II.

Table 9 presents the social stratification of our psychiatric population in terms of the type of practice or treatment agency in which they are found.

These data demonstrate a highly signifi-

cant and expected relationship between social level and type of practice. Some two-thirds of all upper-level patients are treated in private practice while patients of lower social levels are concentrated in state hospitals. This latter finding is undoubtedly related to the fact that a large proportion of the cases at level V are chronic psychotics requiring long-term care.

SUMMARY

The relationship between social level and psychiatric disorders has been explored by a demographic study of patients (*i.e.*, patients in professional contact with psychiatrists) in metropolitan New Haven, and by a background study of the stratification of a sample of the general population in the same community. Significant relationships have been found between social level and (1) prevalence of psychiatric patients according to our definition, (2) types of psychiatric disorders in the patient population, and (3) types of therapy. Our data throw some light on social stratification in current psychiatric practice; they suggest the existence of an uneven social class distribution of psychoses in the general population. The project will continue, by sociological, psychiatric, and psychological techniques, to gather facts and to explore the meaning of the preliminary findings reported in this paper. Only a study of incidence and prevalence of psychiatric disorders in the general population will solve some of the basic problems posed.

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DISCUSSION

DR. FREDERICK WEISS (New York, N. Y.).—Earlier studies of the problem, such as Niceforo's "Anthropology of the Non-Propertied Classes," Mosse's "Illness and Social Condition," Grotjahn's "Social Pathology," suffered from 2 deficiencies: from a lack of adequate statistical data, and from a very limited understanding of the specific dynamics of a social structure as well as of a psychiatric disorder. The relationship between these 2 factors is definitely not the same as, for example, the relationship between social structure and tuberculosis. I remember the strong impression I received when I saw the first time in the study of public health that a city map arranged according to social levels presented a practically exact negative of the same map showing the incidence of tuberculosis. In the case of mental illness, the relationship is not a merely quantitative one. Psychiatric disorders are not social disorders in this simple sense; but they are social disorders in the larger sense of the modern psychodynamic conception. Neuroses and functional psychoses develop in the unhealthy emotional climate of disturbed interpersonal relationships. The individual whose growing self is weakened by lack of love, affec-

tion, and genuine acceptance feels isolated in a potentially hostile world, develops basic anxiety, becomes more and more alienated from himself, and turns to neurotic or psychotic solutions to overcome his intrapsychic and interpersonal conflicts. Thus there exists a relationship between social structure and psychiatric disorders; but it is a qualitative one, determined not by the macroscopic factor of the social level—there are Harlem neuroses and Park Avenue neuroses—but by the microscopic factor of the earliest and closest environment. Adolf Meyer's concept of mental illness as a psychobiological reaction to life situations, Halliday's broad definition of psychosocial disorder, and Horney's view of neurosis as distorted human growth, might contribute to a better insight into the relationship between social structure and psychiatric disorders.

It is the threat to vital values, vital for the safety of the specific individual, that often sets in motion the neurotic or psychotic process. This vital value *may* be economic security, but it may also be the specific value of love, prestige, power, and, particularly, of the idealized image that the person has built of himself.

The figures in Table 6 of Dr. Redlich's paper, which dichotomizes neuroses and psychoses by social level, and which shows a relatively high incidence of neuroses in the higher levels, a remarkable low in levels IV and V, and the reverse for psychoses, have to be reevaluated in the light of the fact that only very few of the neurotic patients of lower levels reach the psychiatrist, while most of the psychotic patients of this group are institutionalized.

The fact that the index of prevalence of schizophrenia in level V is 9 times as great as in level I, corresponds to the findings of Ludwig Stern (1913), who studied the ratio of schizophrenia to manic-depressive psychosis. He found the ratio to be 2.6 in workers, but only 0.7 among business owners and public officials. Tietze, Lemkau, and Cooper (1939) also found this ratio to be 2.9 among laborers, but only 1.1 among proprietors, managers, and officials. This appears to be a rather significant finding, which should be analyzed, however, not only with focus on the general social level or relative predominance of Kretschmer's schizothymic or cyclothymic personality type, but with special attention to the psychodynamic aspects of the early emotional environment.

METHOD AND RESULTS OF ELECTRIC CONVULSIVE THERAPY DURING COMPLETE CURARIZATION ¹

WITH OBSERVATIONS ON A CURARE ANTAGONIST, TENSILON ²

JACQUES S. GOTTLIEB, M.D., AND LUCIEN E. MORRIS, M.D., IOWA CITY, IOWA

Electric convulsive therapy has been shown repeatedly to be an efficient treatment for patients with pathologic depression. The depressive disorders of aged patients are complicated by chronic disabilities, such as those involving the cardiovascular, neural and skeletal systems, which make the administration of convulsive therapy hazardous. Fatalities have occurred but the incidence is believed to be sufficiently low to warrant the use of convulsive therapy when pathologic depression is the primary incapacitating syndrome.

Patients with preexisting severe bony disease such as far-advanced osteoporosis or osteomalacia have heretofore usually been denied electric convulsive therapy because of the danger of compression fractures. This group represents a small but appreciable segment of our aging population. Because they have been regarded as untreatable, many of them are to be found in institutions.

It was thought that this special group of patients could be protected from possible fracture during ECT by completely removing the muscular manifestations of the convulsion by deliberate injections of apneic doses of curare or other relaxant substance. To do this it would be necessary also to take over adequately and completely the ventilation of the patient. The technique for this procedure and the results of treatment in severely depressed patients who suffered from severe osteoporosis of the spine is reported here. The employment of Tensilon ((3-hydroxyphenyl) dimethylethyl ammonium chloride) to shorten the period of curarization is also described.

¹ Presented, in part, at the Second International Gerontological Congress, St. Louis, Mo., September 9-14, 1951.

From the Iowa Psychopathic Hospital, the Department of Psychiatry, and the Division of Anesthesiology of the Department of Surgery, State University of Iowa, College of Medicine, Iowa City, Iowa.

² The drug, Tensilon, was kindly supplied by Hoffman-LaRoche, Inc., Nutley, N. J.

TECHNIQUE

Six patients have been treated by means of electric convulsive therapy during complete curarization at the rate of 2 treatments a week. A total of 47 such treatments have been given.

In most instances, for the comfort of the patient, 100 to 250 mg. of Pentothal Sodium (sodium-ethyl-(1 methyl-butyl)-thiobarbiturate) was initially injected intravenously. Then Tubocurarine chloride (tubocurarine chloride pentahydrate) or one of the other muscle relaxants was administered intravenously in sufficient dosage to cause absence of muscular movement, which, of course, also included inactivity of the respiratory muscles. The amount of curare or curare-like substance needed varied from patient to patient, and from treatment to treatment. Intocostin (tubocurarine chloride pentahydrate) was used for 3 treatments, Syncurine (decamethonium bromide) for 16, and Tubocurarine chloride for the remaining 28.

As respirations began to fail owing to the effect of the muscular paralyzant, they were assisted by the anesthetist and especial care was given to the maintenance of adequate ventilation throughout the entire remaining portion of the procedure. Five to 10 minutes after administration of one of these drugs when complete curarization was present, the electrodes were placed in the conventional bitemporo-frontal position and adequate electrical stimulation was given. The standard Cerletti-Bini method was employed. This procedure interrupted manual ventilation for 20 seconds or less. Manual ventilation with bag, mask, and at least a 10-liter per minute flow of oxygen was continued then without interruption until such time as the patient could resume this function for himself. No harm to the patient from the complete curarization would be expected if adequate ventilation is maintained to provide sufficient oxygen and adequate removal of carbon dioxide. Carbon dioxide removal may be accomplished

by constant flushing of the anesthesia bag and mask with the high flow of oxygen. Maintenance of artificial ventilation was required for variable periods, usually 30 to 60 minutes, although in one instance it was necessary to so support the patient for 200 minutes. As the effects of the curarization diminish, respiration gradually returns but at first is inefficient. These inadequate respiratory efforts must be supplemented by the manual compression of the anesthesia breathing bag sufficiently to maintain adequate transport of carbon dioxide and oxygen. Since curare remains in the blood stream for appreciable lengths of time⁽¹⁾, these patients need careful watching for another hour or more to avoid possibility of obstruction and anoxia.

During manual ventilation, secretions were removed by suction at frequent intervals in order to prevent obstruction. On occasion atropine sulfate was given intramuscularly at the beginning of the procedure to reduce the secretory flow. Apparatus for endotracheal intubation was available and was used when necessary to facilitate the maintenance of a clear air passage.

In order to shorten the period of artificial ventilation, Tensilon was administered intravenously in 5 to 10 mg. doses and repeated at intervals of 5 minutes or more if needed. This drug was used only as an adjunct to oxygen, bag, and mask, the latter being continued until the patient's ventilation had become adequate. Patients were then returned to the ward where they were under continual observation for several hours.

Because of the complete curarization there were minimal peripheral manifestations of the convulsions. In some instances clonic rhythmic movements were recognized by palpation of the muscles of the arms or legs. In other instances no muscle response could be noted. It thus became necessary to define a convulsion by means other than the usual cry, loss of consciousness, and tonic and clonic movements. This was done by obtaining electroencephalograms. The electrical potential pattern was that of a convulsive discharge without the superimposed masking of associated muscle potentials. By this means it was possible to differentiate between

a subconvulsive neural discharge and a convulsive one.²

CASE REPORTS

CASE 1.—An emaciated, weak 72-year-old woman was admitted to the hospital on May 25, 1950, in an agitated and depressed state of 2 years' duration. In addition she complained of severe pain in her spine. These complaints were consistent with the history of a progressive postmenopausal osteoporosis of 13 years' duration. Roentgenograms of the dorsal and lumbar spine showed advanced osteoporosis. The cortex of the vertebrae was of paper thinness showing pronounced demineralization and atrophy. The 7th, 8th, and 12th thoracic vertebral bodies were wedge-shaped, indicative of compression fracture. The roentgenologists' impression was that this spine could not withstand the least stress without more fractures being produced.

In addition the patient had generalized arteriosclerosis. The heart was enlarged to the left and there was an apical systolic murmur. Roentgenograms indicated a left ventricular hypertrophy with extraordinary tortuosity of the aortic arch. The arch of the aorta was dilated and the trachea was shifted toward the right, possibly by an aortic aneurysm. The electrocardiogram indicated a right bundle branch block with sinus tachycardia. Both by clinical and psychometric study there was no evidence of impairment of the sensorial functions that was not consistent with her age.

Because of the severity and prominence of her depressive symptoms, it was finally decided to treat her with ECT using the technique of complete curarization. She was given 12 convulsions at the rate of 2 a week. Each treatment was initiated by sufficient Pentothal Sodium administered intravenously to produce sleep. The first 3 curarizations were accomplished by the intravenous administration of Intocostin, 21 to 24 mgs. Syncurine in dosages from 6 to 9 mg. was used for the subsequent 9 treatments. Manual ventilation with bag and mask was required from a minimum of 45 minutes to a maximum of 150 minutes per treatment.

There was gradual and continual clinical improvement with regard to the agitation and depression, although during the period of hospitalization she developed signs of cardiac failure. This responded to digitalization and did not occasion interruption of therapy. Following the course of treatment, repeat roentgenograms indicated an increase in the wedging of the 12th thoracic vertebra. This may have resulted from either her activity on the ward or from the therapy. At the time of her discharge on August 15, 1950, the signs and symptoms of depression had all but disappeared and she was able to return to the home of relatives. A follow-up report one year later indicated a retention of but minimal symptoms of the depression.

² The electroencephalographic and the electrocardiographic phenomena and certain other physiological concomitants of the convulsive state during complete curarization will be reported subsequently.

CASE 2.—A 73-year-old woman, admitted to the hospital on July 1, 1950, who had been depressed for 18 years following the suicide of her husband. Symptoms had increased in intensity during the previous 6 months and relatives could no longer care for her at home.

Physically she suffered from moderate generalized arteriosclerosis. The heart was enlarged and there was a low-pitched soft systolic murmur heard best along the left border of the sternum and transmitted to the neck vessels. There was an increased pulse pressure as evidenced by the blood pressure of 200/90. Roentgenograms showed evidence of considerable calcification within the aortic knob. These signs suggested involvement of the aortic valves.

Roentgenograms of the spine were interpreted as indicative of severe osteoporosis of all the visualized bones although there was no evidence of compression fracture. There was also a mild degree of degenerative arthritis. A battery of psychologic tests indicated that intellectually she was functioning at a normal level for her age.

The patient received 2 electric convulsive treatments. The first was given after an initial injection of 150 mg. of Pentothal sodium and 21 mg. of Tubocurarine chloride. At the end of 90 minutes the effects of the curarization had disappeared. Two days later the second treatment was given after a preparatory injection of 125 mg. of Pentothal Sodium and 8 mg. of Sincurine. The patient was thought to have recovered from the effects of the Sincurine at the end of 60 minutes and had already been returned from the treatment room when it was observed that she suddenly became ashen, the pulse became imperceptible, and she expired. Unfortunately, permission for an autopsy could not be obtained but death was considered to be most probably a cardiac one.

CASE 3.—A small, partially deaf 77-year-old woman who developed her fourth depression, which was quite severe, 6 months before admission to the hospital on June 21, 1950. She was also suffering from generalized arteriosclerosis. The heart was enlarged and there were systolic aortic and apical murmurs. There was a consistently elevated blood pressure, averaging 220/110. The electrocardiogram indicated auricular fibrillation, which was not constant but episodic. There was a large pelvic mass that was diagnosed as a uterine myofibroma. There was also a premalignant polypoidosis of the sigmoid. Roentgenograms of the vertebral column showed both advanced postmenopausal osteoporosis and degenerative joint disease involving particularly the dorsal vertebrae.

The patient received 7 convulsive treatments at the rate of 2 a week. Each treatment was initiated by an intravenous administration of Pentothal Sodium. Sincurine was the muscular relaxant for the first 6 treatments, the dosage being 8 mg. on each occasion. Manual ventilation by bag and mask was needed for 30 minutes to 120 minutes for these 7 treatments. Tubocurarine chloride 45 mg. was used for the 7th treatment; and at the end of the procedure Tensilon was administered as a tool to

shorten the period of recovery from curarization. This drug was given intravenously in 10 mg. doses at 5-minute intervals until a total of 40 mg. had been given. Following the third dose of Tensilon the pulse became totally irregular and the irregularity persisted for several hours.

Following the course of therapy, roentgenograms of the spine indicated no increase in bony pathology. The clinical condition of the patient had improved considerably with regard to her depressive symptoms and she was discharged to her relatives on August 12, 1950. The posthospital course showed that the remission was not retained and that after a month she again became mildly depressed. This mild exacerbation was soon followed by a spontaneous remission.

CASE 4.—A 68-year-old woman admitted to the hospital on November 17, 1950, because of symptoms of depression that began 2 weeks following a cataract extraction in August, 1950. She had experienced a similar previous depression at the age of 38 following childbirth.

Physically she was moderately obese and walked with difficulty because of hypertrophic arthritis of the knee joints. Both eyes had iridectomy scars. The heart was enlarged to the left, but the rhythm was regular. The blood pressure averaged 180/95. Arteriosclerosis was not particularly prominent. Although electrocardiograms taken in August, 1950, indicated a left bundle branch block the recordings during this period of hospitalization were normal. Roentgenographic study of the spine indicated severe osteoporosis. The impression of the roentgenologist was that any severe jolt would probably result in a fracture.

The patient was treated by electric convulsive therapy during complete curarization, receiving a total of 13 treatments at the rate of 2 a week. These procedures were initiated by Pentothal Sodium. The amount of Tubocurarine chloride varied from 24 mg. to 36 mg. per treatment. Tensilon was given intravenously in 5 to 10 mg. amounts and repeated after a few minutes in the latter 8 treatments. The amount given per treatment varied from 10 mg. to 35 mg. When Tensilon was given for the second treatment a severe cardiac arrhythmia developed after the second 10 mg. dose, which was given 7½ minutes after the initial dose. This arrhythmia persisted for 17 minutes. Thereafter for further treatments, Tensilon was given in 5 mg. doses with more than 10 minutes between injections. No subsequent complications occurred. The administration of this drug reduced the time of manual ventilation from an average of 51 minutes for the first 5 treatments to an average of 34 minutes for the latter 8 treatments.

Several days after the course of therapy had been discontinued the patient slipped and sat down hard while picking up a magazine from the floor. She complained of a pain in her back and roentgenograms indicated a compression fracture of the 2d lumbar vertebra, that was not present in the roentgenograms taken after treatment had been completed. The patient recovered from her depression

and at the time of discharge from the hospital on February 28, 1951, was symptom-free. The post-hospital course for one year indicated that she had remained well.

CASE 5.—A 75-year-old deaf and undernourished male admitted to the hospital on June 18, 1951, because of a depression of one year's duration that was becoming progressively worse. Physically, in addition to bilateral deafness, there was a coarse resting tremor of the right hand, a rigidly maintained spine so that when he lay supine he was scarcely able to rest his head on the examining table, a heart normal to size but with an audible soft systolic murmur heard best at the apex, a mildly emphysematous chest, and a moderately enlarged benign prostatic hypertrophy. Arteriosclerosis was moderate and generalized. Electrocardiographic study suggested myocardial disease. Roentgenographic study of the spine indicated far-advanced osteoporosis, moderately advanced degenerative arthritis, and a lower dorsal upper lumbar scoliosis to the right.

Electric convulsive therapy was instituted during complete curarization. After the 4th treatment all symptoms and signs of depression had disappeared and the procedure was discontinued. These 4 treatments were initiated by Tubocurarine chloride mg. 27 to mg. 36 without any Pentothal Sodium in order to obtain certain physiologic observations.

The patient was happy and cheerful, free from all complaints for one week when symptoms of depression began to return. He received 8 more convulsions, each of which was initiated by Pentothal Sodium, followed by Tubocurarine chloride 30 mg. to 36 mg. Manual ventilation by mask, bag, and a 10-liter flow of oxygen were required from a minimum of 21 minutes to a maximum of 94 minutes. Tensilon was administered intravenously in 5 or 10 mg. doses and repeated when indicated from a minimum of 10 mg. to a maximum of 20 mg. per treatment. There was a complete remission of his depression permitting him to be discharged home on September 1, 1951. A 9-month posthospital follow-up indicated that he had remained free from symptoms of depression.

CASE 6.—A tall, thin 52-year-old man, hospitalized on June 22, 1951, for evaluation of numerous complaints. Six months before admission the patient had a sudden attack characterized by loss of speech for several hours and confusion for several days. Following this episode there was difficulty in pronouncing words. Three months before admission he became depressed, disinterested, retarded, unable to sleep, and suicidal. It was these latter symptoms that led to his hospitalization.

Physical examination revealed dysarthria, generalized arteriosclerosis, a severe kyphoscoliotic thoracic cage deformity, advanced emphysema, enlargement of the heart to the left, an apical systolic murmur, blood pressure 120/70, varicose veins of the lower extremities, pitting ankle edema, and very large hands and feet. Neurologically, the only posi-

tive finding other than the dysarthria was a drooping of the right buccal angle of the mouth.

A battery of psychological examinations failed to indicate any further signs of organic deterioration. An electrocardiogram was interpreted as indicating auricular disease and an anteroseptal infarction. An electroencephalogram was characterized by some 12½ to 15 per second activity in a predominant 9 to 11 per second record without evidence of focal abnormality. Roentgenographic study indicated the following: left ventricular hypertrophy, an extreme degree of dorsal kyphosis with considerable wedging of the anterior aspects of the mid-dorsal vertebrae, far-advanced osteoporosis and degenerative arthritis, emphysema, tufting of the distal phalanges of the fingers, and a normal skull.

After considerable hesitancy, considering the risks due to the accompanying illnesses of the patient, it was finally decided to administer ECT. In order to provide complete curarization, he was given 52 mg. of Tubocurarine chloride. Eight minutes later, after complete relaxation had occurred, a bitemporo-frontal stimulus of 130 volts was applied for 0.4 second. This resulted in a convulsion that as recorded by the electroencephalograph persisted for 8 minutes. Twenty minutes later Tensilon 10 mg. was administered intravenously for the usual purpose of shortening the period of curare effect. Electric potentials indicating convulsions again appeared and there were also now mild clonic movements as curarization had slightly diminished. These lasted without interruption for 20 minutes. Endotracheal intubation was performed to facilitate both manual ventilation and the removal of secretions by suction. Thirty-eight minutes after the original electrical stimulus had been given, approximately 450 mg. of Pentothal Sodium was injected intravenously. There was then suppression of the convulsions for 55 minutes except for a persistent focus of slow electrical activity with spikes in the electroencephalogram of the left temporo-parietal region, which as time went on gradually spread over the cortex. During this intervening time 30 mg. of Tensilon had been given in three 10 mg. doses. When the convulsive neural discharge had become generalized again, 450 mg. of Amytal Sodium was injected intravenously, which terminated the status epilepticus. It was necessary to continue manual ventilation, however, for 75 minutes longer until the spontaneous ventilation was considered adequate. The patient was restless for several hours but responded to painful stimuli.

The following day the patient was responsive and attempted to cooperate, but was confused and could only say "No," "Huh," and "Yes." On the second day after the treatment the patient had apparently returned to approximately his pretreatment clinical condition when late in the afternoon he suddenly became cyanotic, dyspnoeic, confused, and weak. His pulse was exceedingly rapid and thready. An electrocardiogram taken within a few minutes indicated a nodal auricular tachycardia with a heart rate of 170 per minute. Quinidine gluconate was administered intravenously and after 500 mg. had been given the cardiac rhythm had returned to nor-

mal. During the administration of this drug, however, the patient developed a toxic psychosis characterized by confusion, restlessness, fear, and bright vivid visual hallucinations. Quinidine sulfate, 200 mg. t.i.d., was given by mouth for one day and then discontinued as it was considered a contributor to the toxic state. The patient was digitalized instead. The toxic psychosis gradually subsided during the ensuing week and at the time of discharge on August 24, 1951, his condition had returned to approximately the same as it was before hospitalization and the treatment.

COMMENT

A method of curarization has been described that by removing the muscular manifestations of convulsions allows the application of ECT to aged patients with pathologic depression who also suffer from severe bony disease of the spine. This method requires the administration of sufficient amounts of curare to produce paralysis of the voluntary musculature. Curare in large doses is dangerous, primarily because of the removal of the patient's ability to ventilate. This means that the ventilation must be adequately supported by the physician at all times. Because of the hazardous nature of the technique it should not be undertaken by anyone who is not an expert in the maintenance of artificial ventilation and in the care of comatose or anaesthetized patients.

In the series of cases reported, the technique protected severely diseased vertebrae from further injury. The first patient who had preexisting fractures of the 7th, 8th, and 12th thoracic vertebral bodies showed evidence of some extension of the pathological process after receiving 12 convulsions. This consisted of an increase in the wedging of the 12th thoracic vertebra, which may well have resulted from her activity on the ward rather than from the therapy. The fourth patient, after 13 treatments had been completed, showed no roentgenologic evidence of a fracture. Subsequently she sustained a compression fracture of the 2d lumbar vertebra when she slipped and sat down hard on the floor. In the remaining 4 patients no change could be discovered in their osseous system.

There is evidence that this procedure is therapeutically effective for patients suffering from pathologic depression. Of the six patients who have been treated by this tech-

nique, 2 were completely relieved of their depression; 2 were partially relieved and were able to return home where they could be cared for with ease rather than remain as chronic hospital patients; one patient who had a focal cerebrovascular lesion developed a status epilepticus; and one died suddenly after having been returned to the ward. All 6 aged patients were poor risks for any procedure; in addition to the depression and the severe osteoporosis of the spine, they also suffered from either or both cardiovascular and cerebrovascular disorders. Their total physical incapacities were so great that it was extremely doubtful that ECT could have been given without complete curarization. This procedure, therefore, permitted an extension of ECT to a small group of depressed patients for whom this treatment otherwise could not be given. The undertaking of this procedure must be carefully weighed in view of both the psychic and somatic pathology of these patients. The risks, even of death, should be discussed thoroughly with relatives before treatment begins. It is our considered impression that in spite of the hazards the procedure is justified in certain selected instances.

DISCUSSION OF EXPERIENCES WITH TENSILON

Tensilon is a drug that has recently been introduced as an antagonist to curare(2). It was given intravenously on 22 occasions when the patients had been completely curarized with Tubocurarine chloride. This was done in order to observe its effect in a completely curarized patient and to assess its usefulness as an agent in shortening the time required for artificial ventilation. The initial dosage varied from 5 to 10 mg. and was repeated at variable intervals from 3 to 30 minutes. The maximum amount given after any single curarization in this series was 40 mg. The observation of the effects of Tensilon led to the following impressions:

1. The administration of Tensilon, at a time when spontaneous respiratory efforts were absent, did not provide sufficient anticurare effect to overcome the respiratory paralysis. One could not say, therefore, that Tensilon either enhanced or counteracted the curare effect. For this reason, until more is

known about the effect of Tensilon under these circumstances, it would seem to be wiser to avoid the use of this drug during the period of apnoea in a patient overdosed with curare.

2. It is believed that the optimum time for the administration of Tensilon is after respiratory movements have begun to return spontaneously. If given then, there is a pronounced increase in the depth of respiration. The length of time that manual ventilation is required to assist inadequate respiration is also materially reduced.

3. The frequent repeated administration of Tensilon during apnoea led in 2 instances to severe cardiac arrhythmias. This has not been observed following the administration of Tensilon to the curarized patient during anesthesia. However, the more complete curarization used in this procedure may be a factor. It is possible also that Tensilon through a cholinergic action reinforces the vagal discharge associated with the convulsive state. Either of these factors may have been related to the cardiac irregularity.

4. Because of the possible side effects, such as the occurrence of cardiac irregularity in 2 patients and status epilepticus in one patient, it is our opinion that the administration of Tensilon in this procedure should be limited to a total of 20 mg. in doses of 5 mg. each at intervals of 5 to 10 minutes. A sustained effect of increased respiration was more frequently obtained by the repetition of small doses of Tensilon than by a single larger dose.

5. The response to Tensilon, as observed by spontaneous movements of various parts of the musculature including those of the toes, is frequently evident in 20 to 25 seconds from the time of injection. Since this time is

within the circulation time from the antecubital fossa to the brain and may be shorter than the circulation time to the foot, the possibility of a central action should be entertained. This possible effect is in addition to the local action at the myoneural junction.

6. No antagonist of curare should be solely relied upon to overcome respiratory arrest, but should be considered as ancillary to mask, bag, and oxygen for maintenance of the proper gaseous exchange of the patient.

SUMMARY

1. Six elderly depressed patients with severe osteoporosis of the spine and other physical disabilities were treated by electric convulsive therapy during complete curarization. The method of complete curarization allowed the administration of electric convulsive therapy without danger of producing further injury to diseased skeletal structures, and thus extended the usefulness of this therapy to patients who otherwise would be unable to receive it.

2. The results of experiences with Tensilon indicate its limitations and its usefulness as an adjunct to bag, mask, and oxygen in the maintenance of the proper ventilation of the patient when the patient had been completely curarized.

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PRELIMINARY OBSERVATIONS ON CONVULSIVE AND SUBCONVULSIVE TREATMENTS INDUCED BY INTERMITTENT PHOTIC STIMULATION¹

GEORGE A. ULETT, PH.D., M.D.,² ST. LOUIS, MO.

Since Meduna's description of a convulsive therapy induced by intramuscular injection of camphor, there has been a constant search for new and better methods of "shock" treatment. After general acceptance of the fact that Metrazol-induced seizures produced at least a shortening of the time of hospitalization for depressed psychotic patients, this type of convulsive treatment was largely abandoned for a variety of reasons that included undependability of seizure production, pre-seizure apprehension, severity of reaction (including multiple convulsions), venous thrombosis with embolism, and fractures.

The introduction of electricity in convulsive treatments brought with it an ease and simplicity of method that has made commonplace the phenomenon of push-button therapy. Even such treatment, however, was not without its shortcomings, and curare, barbiturates, and "glissando" have been added with only partial success in reducing the occurrence of fractures. Although there is little convincing evidence of brain damage following electric shock(1) there have been a number of attempts to reduce the strength of the electrical stimulus used in ECT treatments, and currents with pulses of briefer duration and diverse form have been utilized. No one of these is today accepted as the best mode of treatment nor has experimental work given a rationale to explain why one type should therapeutically be more efficacious than another.

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From the Department of Neuropsychiatry, Washington University School of Medicine, and the Research Laboratories of the Malcolm Bliss Psychopathic Hospital, St. Louis, Mo.

² With the technical assistance of Ruth Ellermann, R. N.

Yet another variation of shock treatment is the triggering of convulsive reactions by means of an intermittent light stimulus. That a flickering light can produce a seizure in certain susceptible patients was observed in 1885 by Gowers(2) who reported that in some epileptics seizures were induced by the flickering of an open fire. The demonstration that brain potentials could be controlled by a flashing light was reported in 1934 by Adrian and Matthews(3). Such a stimulus, in conjunction with Metrazol, has recently been used as an aid in the study of convulsive disorders(4).

In 1949 Gastaut and Cossa(5, 6) introduced the term "photo-choc" for the triggering of Metrazol seizures by intermittent photic stimulation. O'Flanagan and co-workers(7) reported observations on the use of photic stimulation, following the intravenous injection of Azazol, to induce myoclonic reactions in 35 patients with various psychiatric diagnoses. In a typical stimulatory treatment they induced paroxysmal activity in the brain for a period of 10 minutes. We have utilized this method to produce both myoclonic and generalized convulsive treatments and this paper is a discussion of our preliminary observations.

METHOD

The light stimulus used was a 1,000-watt tungsten-filament 16 mm. projection lamp whose beam was concentrated by an appropriate lens system and then directed on the subject's face by means of concave mirrors. Intensities of 500 to 1,000 foot candles were used. Frequencies of 2-30 flashes per second were obtained by means of a pendulum-type episcotister controlled by a Hewlett-Packard low-frequency oscillator.

Prior to treatment an EEG was taken on each patient and his sensitivity to 22 different frequencies of stimulation was studied by brief, 40-second exposures to the photic stimulus within the range of 2-30 flashes per

second. For such studies a Walter-type electronic brain wave analyser was found useful. From this study we could determine the frequency that produced the greatest brain wave response. This frequency was in most cases the stimulus used to trigger the patient's reactions.

Subjects were started with 0.2 cc. of a 5% solution of Azazol (4-cyclohexyl-3-ethyl-1:2:4-triazole) given intravenously. This dose was increased by 0.2 cc. until the desired result was achieved. In subjects who became fearful, sedation was given and the patient treated while asleep or drowsy. Light stimulation was started immediately after this injection and was continued without interruption at one frequency until the convulsive effect was achieved. For optimal effect the stimulation was given with eyes closed. At times paroxysmal brain activity could be enhanced by opening and then closing the eyes rapidly or by brief interruptions of the stimulus.

RESULTS

Two hundred and fourteen treatments were administered to 16 patients of varied diagnosis (Table 1); of these 114 were stimulatory (subconvulsive) in nature and 100 were convulsive (i. e., produced generalized seizures). For purposes of recording treatment results we used the following classification of clinically observed effects produced during stimulation:

MR + : (myoclonic reaction one plus) rhythmic peri-orbital jerking only.

MR ++ : myoclonus involving face, head and/or shoulders.

MR +++ : spasmodic jerking of whole body but without loss of consciousness.

++++ : was used for reactions in which there was forced deviation of the eyes to one side with some impairment of consciousness or for a prolonged period of amnesia but without generalized convulsion. In such reactions the myoclonic component was often minimal or absent.

GM : ("grand-mal") generalized seizure.

In the present study we have been mainly interested in exploring the method. Observations have been made on at least 3 important parameters: amount of the drug required to produce subconvulsive and convulsive responses, the effect of varying the speed of injection, and the optimum frequency of light stimulus.

In this preliminary phase we have been most concerned with how best to administer the Azazol but a few remarks about the stimulus frequency can be made. Surveys of each patient with frequencies of 2-30 flashes per second revealed that usually the greatest brain response (driving) occurred in the range from 6-20 flashes per second. When a stimulus frequency produced strong harmonic responses or induced paroxysmal brain rhythms it was used to trigger the photically induced seizures. In the absence of such reactions the frequency producing the greatest driving was used and it often turned out to be the best frequency for inducing treatment reactions. A recent report (8) has indicated that stimulus rates of 15 to 20 f.p.s. seem most effective in producing paroxysmal activity. It is our experience, however, that some patients may fail to react to frequencies within this range yet respond with convulsive seizure to stimulation at lower frequencies. In two of our patients generalized seizures could be induced with rates of 6 flashes per second or below. In these patients faster frequencies would produce only MR responses.

In two subjects MR reactions could be induced by the light stimulus alone. In all other patients a sensitizing dose of Azazol was necessary. From 0.2 to 0.6 cc. of 5% solution of Azazol injected within a period of 30-40 seconds permitted an MR+ reaction when light stimulation was given within the following minute and preferably as close to the termination of the injection as possible. As can be seen from Table 1 the prediction of the GM from the MR+ dose is fraught with much uncertainty. However, if injection speeds are kept constant, responses of MR++ and MR+++ can be regularly obtained by a two- to threefold increase in medication and would not infrequently be sufficient to induce a GM reaction. In some patients there was an apparent increase in seizure threshold with subsequent treatments and hence prediction of the seizure dose has not been entirely reliable. Body weight is not a good guide for dosage. O'Flanagan (7) felt that the blood sugar level was an important factor in obtaining MR's. We have not as yet investigated this factor in our patients. However, all were treated after a 12-14 hour fast.

TABLE 1

PATIENTS TREATED BY AZOZOL AND INTERMITTENT PHOTIC STIMULATION; KIND OF TREATMENT AND CLINICAL RESULTS

Patient	Age	Sex	Diagnosis	Subconvulsive treatment	Convulsive treatment	Effective stimulus frequency	Amount * of 5% Azozol to produce MR+	Smallest * amount of 5% Azozol to produce GM (without sedation)	Therapeutic results
Jac.	33	F	Mixed psychoneurosis with depression	8	2	15 fps.	0.1 cc.		Increasing agitation: shifted to EST with some improvement.
Mil.	21	M	Schizo-affective depressed	5	4	16	0.25	0.3	Discharged improved.
Lem.	56	F	Mixed psychoneurosis hysteria and depression	8		5,15	0.2		Increasing agitation: shifted to EST with some improvement.
Mes	27	M	Reactive depression with alcoholism	8	2	3,15	0.15		Discharged improved.
Fle.	27	F	Schizo-affective depressed	6	3	13	0.1		Discharged improved.
Leb.	77	F	Senile depression	6	4	8,14	0.2		Unimproved.
Reu.	63	M	Manic-depressive depressed	11	4	18	0.1	1.3	Discharged improved.
					5			1.8	Relapsed in 7 days—Readmitted.
									Improved after first treatment, discharged.
Win.	72	M	Senile depression	7	3	13	0.2		Increasing agitation—treatments discontinued.
Dal.	68	M	Agitated depression	5	8	9,18	0.1	0.4	Discharged improved.
Cos.	65	M	Cerebral atrophy with depression	9	5	13	0.8	1.1	Discharged improved.
McA.	56	F	Manic-depressive depressed	6	12	6, 12, 18	0.4	1.0	Discharged improved.
Der	33	F	Schizophrenia paranoid depressed	9	27	13	0.4	1.0	Marked improvement, awaits discharge
Gre.	58	F	Agitated depression	4	14	13	0.6	0.8	Agitation relieved, depression unchanged, treatment continues.
Hal.	65	M	Manic-depressive depressed	12	1	12	0.2		Increasing agitation, signed out against advice.
Lee.	46	F	Manic-depressive depressed	4	1	15, 16	0.8		Increasing agitation, shifted to EST.
Mey.	62	F	Manic-depressive depressed	6	5	14	0.4	1.3	Agitation relieved, depression unchanged, treatment continues.

* Data omitted where patient was sedated or where injection speeds were not comparable (i. e., injection speed to produce GM within 10 seconds of that for MR+).

The speed of drug injection was an important factor in seizure production (Fig. 1). Thirty seconds was our usual speed of injection. This was varied from patient to patient and from treatment to treatment in accordance with whether we wished to increase or decrease the latent period from injection to convulsion. More rapid injections not only ensured a grand-mal reaction with a smaller quantity of drug but also permitted a more rapid induction of seizure and, to clinical observation, seizures that were more severe and accompanied by an increase in postshock confusion. With slow injections the onset of the seizure was mild and might

seen in 2 of our patients. We encountered no fractures or dislocations in the series and none of our patients complained of post-seizure backache.

The margin between the amount of Azazol that will sensitize the brain to reaction with intermittent light stimulus and that which in itself will produce a seizure may at times be small (0.2 cc. of 5% solution) but further observation on this point is necessary. We have attempted to give amounts of Azazol that would not alter the resting brain wave pattern and hence the patient would react only when exposed to the flashing light stimulus. In this way there appears to be less apprehension during induction and there is an amnesia for the seizure. In the course of developing our method we produced many unwished-for subconvulsive reactions that did not proceed to generalized convulsions, and found that, sometimes, as with Metrazol treatment, marked apprehension and fear of these treatments could develop. Such emotional response was particularly marked in 2 psychoneurotic women. This apprehension could be controlled by the use of sedatives such as Delvalin, Seconal, Sodium Amytal, and chloral hydrate used in various dosages. It was found most satisfactory to induce sleep by intravenous Sodium Amytal and, although this made it necessary to increase the dose of Azazol, the resultant treatment was greatly improved. With intravenous Sodium Amytal we increased the Azazol dosage roughly 0.1 cc. of 5% solution for each 100-200 mgms. given. With chloral hydrate a similar increase was necessary for each gram given orally. The increases necessary, however, varied considerably from patient to patient and also from day to day. With such premedication patients, although roused to consciousness by Azazol and the light stimulus, could sometimes tolerate up to 10 minutes of MR++ and MR+++ subconvulsive treatment without complaint. With such premedication it has been possible to precipitate grand-mal reactions with the patient passing directly into seizure from sleep and with amnesia for the whole procedure when awakening on the ward post-treatment.

No attempt has been made here to analyse the EEG findings in these cases but this will

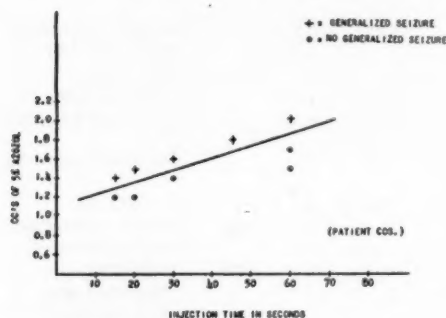


FIG. 1.—Graph indicating the relationship between the speed of injection and amount of Azazol when used with intermittent photic stimulation for the production of generalized seizures in Patient Cos.

follow after 1-2 minutes of light-induced myoclonic reaction. The convulsions produced in this fashion resembled more a spontaneous convulsion, as seen in epileptics, than those produced by standard ECT. The generalized seizures produced by photic stimulation usually began with a deviation of head and eyes to one side, a slow onset of tonus that was maintained from 5 to 10 seconds and followed by a clonic reaction that was usually so mild that it was unnecessary to hold the patient on the stretcher. The total seizure seldom lasted over one minute, and postconvulsive respiratory complications were not a matter for concern. We usually placed a pillow under the dorsal spine and introduced a rolled gauze mouth gag as the patient entered the tonic phase of the seizure. The treatments were followed by but little confusion, and marked postshock euphoria was

be the subject of a more extensive report. Suffice it to say that photic stimulation usually induced a slowing of the EEG with production of 3-8 per second activity with or without spikes (Figs. 2 and 3). Our patients were treated 3 times a week yet no marked slowing was seen in any of the resting EEGs that were taken before each treatment. This was true even in one patient who received 27 GM seizures. With individual subconvulsive treatments the brain wave abnormality would, in most cases, revert to a resting pattern as soon as the light stimulus was turned off (Fig. 2a). In one unusual case, however, where a +++ reaction was produced with amnesia and forced eye movements but with no generalized seizure, the patient remained in a confused state for 3 hours. During this time the brain wave record remained slow (Fig. 3). The patient had some confusion during the ensuing afternoon but was completely clear by the next day although amnesic for the treatment. This reaction was induced with only 0.2 cc. of 5% Azazol and total exposure to flashing light both before and after Azazol for 15 minutes. Subsequent treatments with 10 times this amount of drug and with longer exposures to the intermittent light stimulus produced ++ and +++ MR's but failed to elicit a similar EEG or clinical response in this patient.

The present series of cases is far too small to permit an evaluation of treatment results but some idea of immediate alteration in the disease process can be seen from Table 1. It is our impression that psychoneurotic depressions responded to treatment less well than did the psychotic depressions and that treatments producing GM reactions seemed to be more efficacious than those of subconvulsive type.

DISCUSSION

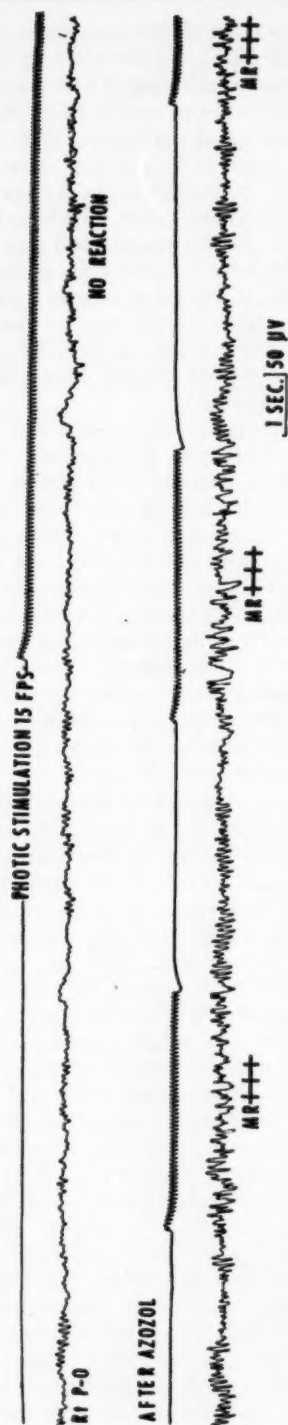
Although the method for producing convulsions (photoshock) presented here may be considered similar to that of Metrazol shock, it is our impression that this modified procedure has several possible advantages. The use of photic stimulation to trigger the seizure permits a lower dosage of convulsant drug with a consequently milder seizure and less apprehension. The generalized seizures produced by this method appear to have a more gradual onset and greater resemblance

to spontaneous epileptic fits than those produced by usual ECT. By the use of a light stimulus one has greater control over the time of seizure onset and can readily bring about a gradual induction of the seizure. With this method there seems to be a greater certainty of producing a seizure than has been reported for Metrazol when used alone. We have had no fractures or dislocations and feel that the treatment is ideal for use with older patients. The production of photic stimulatory treatments (PST), whose depth may be gauged by simultaneous recording of the EEG, introduces a new type of therapy whose value is yet to be determined.

Of perhaps greater importance are the research possibilities of this method. The ability to produce, control, and in some measure quantify the brain wave paroxysm (*i. e.*, in the subconvulsive treatments) could well lead to observations that may increase our understanding of shock treatments in general. Further studies along this line with attention to the effects of varying dosages and speeds of administration of different convulsant drugs may increase our knowledge of the factors controlling convulsive threshold and hence give a rationale for the design of more effective and safer shock therapy.

From our experiences with the method so far, observations have been made that point to the probable untenability of one commonly proposed explanation for the mechanism by which shock therapies produce results, namely, that the treatment is a fear-producing and punishing device that gives the patient absolution from guilt and in this manner relieves depression. In 2 psychoneurotic depressions, where one might expect such a mechanism to produce results, courses of 8 or more subconvulsive treatments had no therapeutic effect. These treatments produced much more dysphoria, apprehension, and fear than the subsequent standard ECT treatments, which were administered later with apparently good therapeutic results. Similarly, in several patients with psychotic depression, it has been our observation that a course of anxiety-producing, subconvulsive treatments had little effect, whereas marked relief from depressive symptoms were produced by photically induced generalized convulsions when the subjects had been put to sleep by intravenous Sodium Amytal and

A SUBCONVULSIVE



B CONVULSIVE

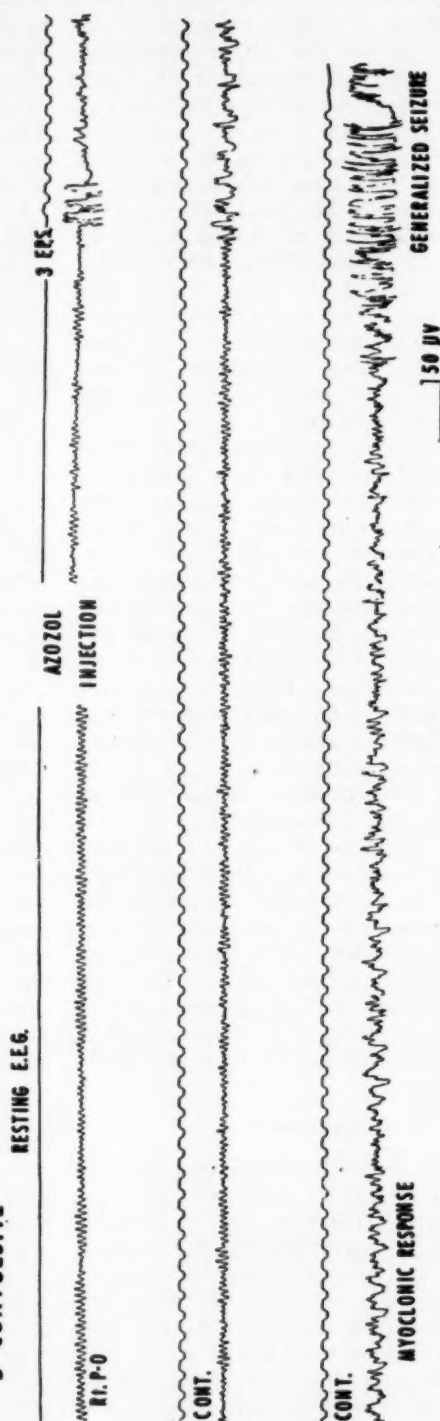


FIG. 2.

(a) EEG of patient receiving subconvulsive photic stimulatory treatment (PST). Light stimulus at 15 f.p.s. produces no reaction in resting subject; after Azozol such stimulation induces EEG change and accompanying myoclonic reaction.

(b) EEG of patient receiving convulsive (photo-shock) treatment. Stimulation at 3 f.p.s. produced first a myoclonic response, later a generalized convulsive seizure.

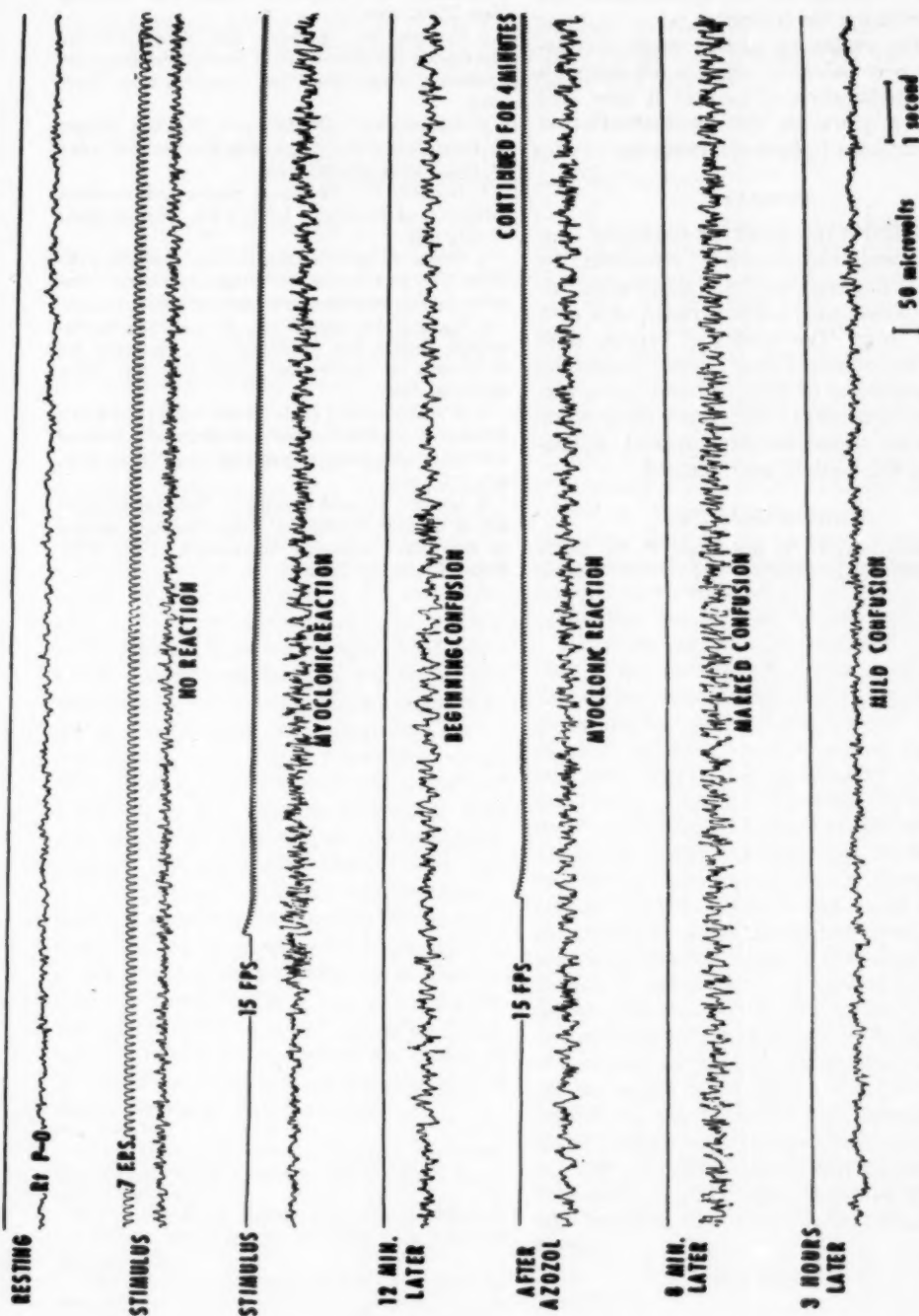


FIG. 3.—Sample from the EEG record of a patient at rest and with intermittent photic stimulation at 7 f.p.s. and 15 f.p.s., the latter producing myoclonic reaction. After 10 minutes of such stimulation the record showed marked slowing and the patient was confused. Following the injection of 0.2 cc. of 5% Azozol solution intravenously, stimulation for an additional 4 minutes produced a continuation of the myoclonic reaction and a marked confusion with spike and slow activity in the resting EEG. Three hours later the confusion was mild and the record was approaching the pretreatment state.

had, as a consequence, no apprehension and an amnesia for the treatment.

Further evaluation of this mode of treatment is now underway and it is felt that with some simplification of method it may well assume a place in the psychiatrist's armamentarium of physical treatments.

SUMMARY

A method is discussed for producing convulsive and subconvulsive treatment by means of intermittent photic stimulation following preliminary administration of a convulsant drug. The results of varying such factors as amount of drug, speed of injection, and frequencies of light stimulus are given. Types of reaction produced and the possible therapeutic results and experimental implications of this method are discussed.

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A COMPARATIVE STUDY OF FLAXEDIL AND SYNCURINE COMBINED WITH PENTOTHAL ANESTHESIA IN MODIFYING ELECTROCONVULSIVE THERAPY¹

WILLIAM L. HOLT, JR., M.D.,² ALBANY, N. Y.,

DONALD NISWANDER, M.D.,³ DEWEY K. ZIEGLER, M.D.,³

RICHARD TURK, M.D.,³ BOSTON, MASS.

Electroconvulsive therapy (ECT) has a definite value, but we encounter patients needing this treatment who have physical contraindications unless softening of the convulsive rigor can be achieved with safety. The degree of softening desired varies with the nature of the physical complication. Only slight modification of the seizure will ordinarily prevent fracture occurrence, but complete abolition of muscular contraction is desirable in the region of a freshly sutured severed tendon, nerve or trachea. Maximal modification of the electric shock seizure by curarizing drugs arrests adequate spontaneous respiratory movement. To prevent the patient from experiencing severe anxiety while positive pressure oxygen is administered, general anesthesia is required. The authors have employed Sodium Pentothal as the anesthetic agent for intravenous use in combination with the 2 curarizing drugs under investigation, Flaxedil and Sincurine.⁴ Pentothal in 5% solution is miscible with 2% solution of Flaxedil (tri-(diethylaminoethoxy) benzene triethyl iodide) and with 0.1% Sincurine (decamethonium bromide), allowing simultaneous injection of the anesthetic and the curarizing drug in one syringe. A minimal amount of Pentothal is given so that the brevity of its action will allow the therapist to test the patient's power on voluntary effort and thereby gauge the degree of modification to be expected and first to give added curarizing drug if needed.

The value of curarization modification of electroconvulsive therapy in the treatment of traumatic complications and in their prevention was well described by A. E. Bennett in 1940(1). Two deaths in patients with apparently mild cardiac disease given unmodified ECT by others made us ask what if any added safety could have been assured these patients had one or another curarization modification been employed. Reported deaths from curare-modified ECT have usually been related to respiratory obstruction or cardiac disorder. This led us to study respiratory obstructive and cardiovascular changes in patients given electroshock modified by the curare-like drugs, Flaxedil and Sincurine.

Prior studies on Sincurine(2) carried out at the Boston Psychopathic Hospital have shown that it can be given to modify electroshock in patients with cardiac disease. Marked softening of the seizure obtained with this drug, however, required 10 to 20 minutes of oxygen administration as no antidote was available to cut short the time required for natural recovery from the induced respiratory muscle paralysis. A sharp brief rise in arterial pressure was usual in the hypertensives given Sincurine even when the visible manifestations of the seizure were limited to twitching of the eyelids and pilomotor response. With the appearance of favorable reports on Flaxedil by Mushin(3) and others, we believed further comparative studies would be of value. We have made studies on the cardiovascular changes, untoward respiratory reactions, and response to antidote of patients given electroconvulsive treatments modified with Sincurine or Flaxedil together with Sodium Pentothal anesthesia.

FLAXEDIL

SUBJECTS

Twenty-one patients, 15 female and 6 male, ranging in age from 19 to 76, were

¹ Read at the 108th annual meeting of The American Psychiatric Association, Atlantic City, N. J., May 12-16, 1952.

² Albany Medical College and Albany Hospital.

³ Boston Psychopathic Hospital and Harvard Medical School.

⁴ We gratefully acknowledge assistance given by the concerns that furnished the products tested: Lederle Laboratories for Flaxedil, Burroughs-Wellcome for Sincurine, Hoffman-LaRoche for Tensilon.

studied. The majority were suffering from severe midlife depressions. Curarization was done because of electrocardiographic or clinical heart abnormality, arterial hypertension in the range above 200 mm. systolic, 100 mm. diastolic, or recent fracture or laceration. Sufficient curarization was obtained to prevent any perceptible tonic rigidity during the seizure. This degree of modification causes no significant change in the blood lactic acid, whereas an unmodified seizure causes a two- to threefold rise.

PROCEDURE

Blood pressure and pulse recordings were taken with the patient supine on the treatment wheeled-litter before the administration of any drug. Flaxedil or Syncurine was administered on alternate treatment days. Flaxedil in the amount of 80 to 120 mg., varied according to effectiveness, combined with 250 mg. of Pentothal and 0.9 mg. of atropine sulphate in the same syringe, was given intravenously in 1½ minutes.

Immediately after the injection, the blood pressure and pulse were again determined. Three minutes after the drug injection was completed, the strength of hand grip and knee flexion on shouted command were tested, and if sufficient curarization had been obtained, an intramuscular injection of antidote was given in the deltoid region, consisting of 2 mg. of prostigmine together with 0.6 mg. atropine sulphate. An electroshock stimulus well above threshold, usually 800 ma. for 0.5 sec., was administered bitemporally within 30 seconds of the antidote. Positive pressure oxygen insufflation was used routinely on all patients, beginning midway in the injection of the Flaxedil and continuing until spontaneous respiration of normal depth reappeared (usually within 4 minutes after the seizure), the patient never being allowed to become cyanotic. A Guedel rubber airway and catheter suction were employed when needed to prevent airway obstruction by tongue or mucus.

If the convulsion was sufficiently abolished, blood pressure and pulse reading were taken during the seizure (about half the cases). In those patients with interfering clonic movements, readings were taken immediately on cessation of movements. Only those pa-

tients were included in whom there were at least 3 sets of observations and in whom hypertonus had been prevented.

RESULTS

(a) *Immediate Effect of Injection.*—In 14 patients following injection of Flaxedil and Pentothal there was less than 10 mm. change in blood pressure. Of these, 2 patients were markedly hypertensive, the others, normotensive.

In 5 patients there was a consistent fall of over 10 mm. in both systolic and diastolic blood pressure following injection. Of these, 2 were borderline hypertensives, showing a fall of 15-20 mm. systolic and 10 mm. diastolic in their inconsistent initial blood pressure elevation. Three were markedly hypertensive (180-220 mm. systolic, 100-120 mm. diastolic) and sustained a fall of 40-60 mm. systolic and 10 to 20 mm. diastolic. The remaining 2 patients showed a consistent slight rise in blood pressure after injection. Pulse rates rose in all cases 10 to 40 beats per minute, averaging 20 beats, when measured immediately after injection.

(b) *Readings during and Immediately after Seizure.*—Blood pressure rose 40 to 60 mm. systolic and 10 to 30 mm. diastolic during and immediately after the modified seizure even when the fit was perceived with difficulty. Within 4 to 15 minutes the blood pressure had dropped to pretreatment levels. Pulse rates measured immediately after the seizure were not further consistently and significantly changed though later in certain fibrillating patients irregularities and changes in rate did occur.

SYNCURINE

SUBJECTS

Syncurine was given to all 21 patients studied but increasing tolerance for this drug resulted in less consistent modification and in only 6 cases were there 3 observations of value. Two of these patients were markedly hypertensive.

PROCEDURE

Blood pressure and pulse were recorded before any medication was administered as described for the Flaxedil studies. An in-

jection of 5 to 6 mg. of Sincurine was given intravenously together with the same amounts of atropine sulphate and Sodium Pentothal employed in the Flaxedil treatments, in the course of 1½ minutes. Positive pressure oxygen insufflation with rebreathing bag was used, as with Flaxedil. Oxygen was continued until spontaneous breathing was adequate, usually 10 minutes but on occasion for as much as 20 minutes after the seizure. The seizure was produced as described under Flaxedil.

RESULTS

Blood pressure changes with Sincurine were very similar to those with Flaxedil. Two cases with marked hypertension had a 40-60 mm. drop in systolic pressure while in the others there was less than 10 mm. change immediately after the curarizing injection. During and after the seizure, blood pressure rises of the same magnitude were obtained as for Flaxedil.

The pulse showed no consistent change immediately after the Sincurine injection nor after the seizure in this small group of subjects. Earlier experience among our 97 Sincurine-treated patients had shown several instances of postseizure minor irregularities in rhythm, usually of brief duration.

COMMENT

The fall in blood pressure in the hypertensive patient during and immediately after the curarizing injection can be attributed to the accompanying Sodium Pentothal. The increase in blood pressure during the modified seizure is not in proportion to the strength of the convulsion. The widespread pilomotor erection seen even in the most completely modified seizure, regardless of the curarizing drug employed, suggests that the blood pressure rise is due to autonomic effects of the convulsion independent of skeletal muscle work.

The rise in pulse rate with Flaxedil was not of critical importance in our cases and did not persist beyond the oxygen administration period. The changes in blood pressure are considered significant, especially for patients with coronary disease, even though the blood pressure changes are distinctly less

than when unmodified fits are produced. Coronary occlusion occurred in one of our 111 Flaxedil-treated cases, a woman of 72, severely hypertensive, who abruptly passed into pulmonary edema following her sixth completely modified electroconvulsive treatment. Electrocardiogram and supporting physical and laboratory evidence indicated she had suffered an extensive myocardial infarction. We had no deaths in our series of 208 cases as the 72-year-old woman recovered. Samples of her electrocardiogram are given in Fig. 1.

RESPONSES TO FLAXEDIL AND ANTIDOTES: PROSTIGMINE AND TENSILON

Flaxedil has the advantage over Sincurine of having its effects reversed by 2 specific antidotes, prostigmine and Tensilon. We determined the effects of increasing doses of these drugs upon Flaxedil curarization, in 7 adult nurses and doctors who received a series of injections of Flaxedil, 0.6 mg. per kilogram of body weight. Stoelting grip dynamometer readings and vital capacity measurements were made before and at one-minute intervals after injection. Increasing doses of prostigmine and Tensilon were given intravenously and the degree of recovery recorded. Flaxedil was administered over 1-, 2-, and 3-minute intervals to determine optimal rate of injection to secure maximal muscle paresis. An injection rate faster than one minute produced more prolonged respiratory depression when the antidote was tested; the 3-minute injection gave less initial muscle weakness. The one-minute injection rate was followed after the first injection showed no abnormal sensitivity. Though dynamometer readings were taken at one-minute intervals with the right hand, similar readings taken with the left hand at the 4th, 6th, 9th, and 12th minutes showed greater power in the left hand. A significantly large fatigue factor would explain this inequality. On each subject observations without an antidote were made so that each subject served as his or her own control. In the second part of the experiment, 4½ minutes after the completion of the Flaxedil injection, increasing amounts of prostigmine or Tensilon were given intravenously, several days separating each repetition.

Observations were also made on 16 patients given larger doses of Flaxedil for modification of the electroconvulsion. Four received Tensilon only; 5 received prostigmine only; and 7, both antidotes on alternate days; and all in increasing doses. In these patients the criterion for recovery was the reappearance of adequate respiration.

Comment.—The greater initial muscle jerk with Flaxedil modification as compared with the same degree of Sincurine modification of

mg., given subcutaneously one half hour before each prostigmine experiment in addition to 0.6 mg. given with the prostigmine was necessary in order to prevent symptoms of prostigmine toxicity.

When Tensilon was used, no atropine needed to be given the experimental subjects as no unpleasant side effects occurred. Adequate improvement was often obtained from 2.5 mg. of Tensilon, and with 5 mg. the recovery percentage was over 90% at the 10th

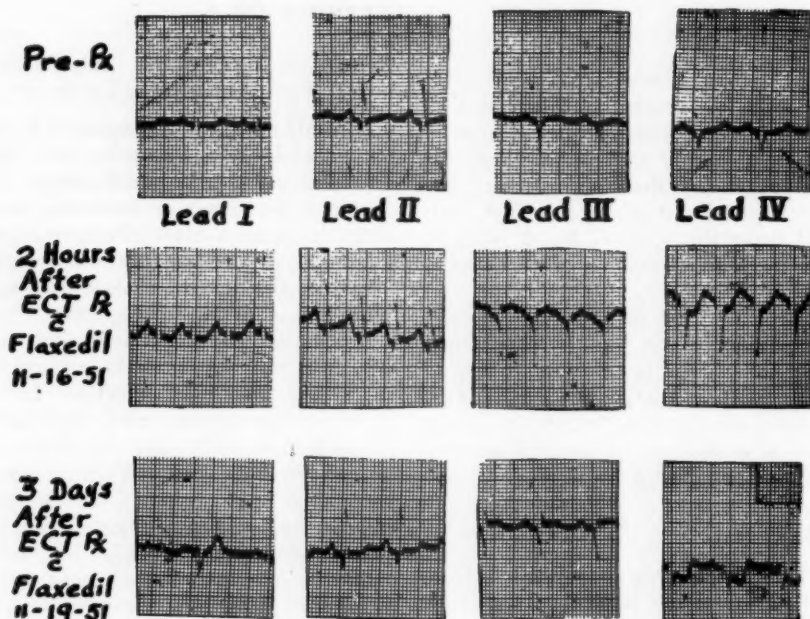


FIG. 1.—Myocardial infarction in the course of Flaxedil-modified electroconvulsive therapy.

hypertonus is probably related to the great fatigue factor in Flaxedil effects.

RESULTS

In 4 volunteers, Table 1 gives the effect of increasing prostigmine dosage upon Flaxedil curarization expressed in percent recovery at 10th minute. Table 2 shows the similar study of increasing Tensilon injections in 3 other volunteers.

COMMENT

Prostigmine in 2-mg. doses given intravenously produced better than 80% recovery by the 10th minute. Atropine sulphate, 0.8

minute. Tensilon is not effective unless given intravenously, but prostigmine is effective by the intramuscular route as well, having thus an advantage in ease of administration. Intramuscular prostigmine should not be given more than 20 seconds before the convulsive shock is given or the modifying effect of the Flaxedil will be decreased. If prostigmine has been given before the seizure has been induced, undue delay in producing the seizure is to be avoided. The electric stimulus should be of the needed brief duration type and well above threshold. The stimulus should be immediately increased and repeated if not promptly effective. Tensilon should be given only after the fit because of its immediate

effects. Doses of 5 to 10 mg. of Tensilon intravenously promptly restored respiratory activity in patients given up to 140 mg. of Flaxedil, and patients could leave the treatment room within 4 minutes. The largest dose of Flaxedil given, 180 mg., was well counteracted by 2.5 mg. of prostigmine within 5 minutes. When Tensilon was used, salivation was hardly noticed. When prostigmine was used, even 1.2 mg of atropine occasionally allowed sufficient salivation to require suction with a catheter to keep the airway unobstructed.

most frequent offender was Pentothal. Syncurine rarely appeared to be a cause of allergic symptoms. No case was found to be allergic to Flaxedil. Intubation was performed in 3 of 97 Syncurine-treated patients and in none of 111 Flaxedil cases. One patient treated with Syncurine and Pentothal developed moderately severe agranulocytic angina after the 6th treatment and recovered with discontinuance of all drugs except penicillin. Subsequent testing with small doses of all drugs given the patient failed to reveal the cause of the agranulocytosis.

TABLE 1

PERCENT RECOVERY FROM CURARIZATION AT TENTH MINUTE WHEN FLAXEDIL FOLLOWED BY PROSTIGMINE INTRAVENOUSLY AT FIFTH MINUTE

Subject	0 mg. Prostig.	0.5 mg. Prostig.	1.0 mg. Prostig.	1.5 mg. Prostig.	2.0 mg. Prostig.	2.5 mg. Prostig.
A	41	84	87	82	81	88
B	8	30	53	44	84	90
C	11	29	70	77	86	92
D	58	70	71	86	92	100

TABLE 2

PERCENT RECOVERY FROM CURARIZATION AT TENTH MINUTE WHEN FLAXEDIL FOLLOWED BY TENSILON INTRAVENOUSLY AT FIFTH MINUTE

Subject	0 mg. Tensilon	2.5 mg. Tensilon	5.0 mg. Tensilon	7.5 mg. Tensilon	10.0 mg. Tensilon
A	48	99	91	100	100
B	60	74	88	89	100
C	58	82	96	100	100

RESPIRATORY COMPLICATIONS

Our observations on respiratory obstruction were limited to 2 patients. Determination of the cause of obstruction was complicated by our simultaneous use of 3 or more drugs. The most frequent difficulty was the appearance of cough, rash, and bronchospasm midway in the injection of the anesthetic and curarizing drug. This was more apt to occur if 4 to 14 days elapsed between successive treatments and if the patient had a history of allergic disorder. The patient usually showed a recurrence of cough in the post-convulsive recovery phase. Antihistaminics such as pyribenzamine or the administration of adrenaline will usually prevent the recurrence of these allergic symptoms or relieve them when they appear. By substituting alternate intravenous anesthetics, such as Nembutal, or alternating the curarizing drugs here reported, we were able to identify and thereafter avoid the offending drug. The

SUMMARY

The authors have treated over 200 patients with electroconvulsive therapy modified by Sodium Pentothal anesthesia and curarization with Syncurine or Flaxedil or both. Sodium Pentothal was the usual cause for the infrequently occurring cough, bronchospasm, and rash. No case of Flaxedil allergy was encountered in 111 patients. The availability of several intravenous anesthetics and several types of curarizing drugs supplemented by antihistaminics helps the therapist to avoid or control allergic respiratory reactions, but intubation should be available.

After maximal softening of the seizure with Flaxedil, the time required for return of self-sustaining respiratory movement can be greatly shortened with the use of prostigmine or Tensilon. This cuts the time of oxygen administration after the seizure in half as compared with Syncurine-treated cases, as for the latter drug no antidote is available.

Tensilon, 5 to 10 mg., must be given only intravenously after the seizure. Its use permits avoidance of atropine, needed when prostigmine is employed. As we believe atropinization is needed to prevent seizure-induced salivation and cardiac arrest, we prefer to give 2 to 2.5 mg. of prostigmine intramuscularly, conserving available veins for the more essential curarizing injection.

After Flaxedil injection, pulse rates rose 10 to 40 beats per minute, whereas Syncurine produced no change. Blood pressure changes with Flaxedil are essentially the same as with Syncurine. Hypertensive patients may show a fall of 40 to 60 mm. systolic and 10 to 20 mm. diastolic, attributed to Pentothal anesthesia. Of 21 "Flaxedil" cases tested, two-thirds (including 2 markedly hypertensive patients) showed less than 10 mm. change in blood pressure before their seizure. During and immediately after the seizure blood pressure rose 40 to 60 mm. systolic and 10 to 30 mm. diastolic even when the seizure was externally perceptible only in the face. We believe that complete abolition of seizure muscle rigor decreases but does not remove the element of danger in the giving of ECT to patients with cardiovascular disease, as changes in blood pressure and cardiac rate and rhythm, probably of central origin, nonetheless occur. This produced coronary occlusion in one of our cases.

Within the limitations outlined above, Flaxedil joins Syncurine as a valuable addition to available synthetic curarizing drugs employed in modification of the electroconvulsion.

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DISCUSSION

DR. WILLIAM A. HORWITZ (New York City).—Dr. Holt and his colleagues are to be congratulated on a thorough work scientifically carried out. They have shown that, where necessary and with a thorough knowledge of the technique and awareness of possible danger points, electroshock therapy can be safely carried out while the patient is deeply under the effects of curare-like drugs, i. e., Flaxedil and Syncurine combined with Sodium Pentothal. There are 3 points that I would like to bring up for discussion.

The first relates to the indications for this type of deeply modified electroshock therapy. I can wholeheartedly agree with Dr. Holt *et al.* that in cases where shock therapy is necessary, and the patient has suffered from a recent serious fracture or laceration of tendon, nerve, or trachea, practically the only way shock therapy can be carried out is with the help of the curare-like drugs. What is more open to question is the advocacy of a deep curarization combined with Sodium Pentothal anesthesia, in patients with coronary disease or other cardiac disorders, or in hypertensive states. Here, I believe the work of Dr. Holt's group has not proven its value and a serious question of its wisdom can be raised. To validate his concepts, Dr. Holt has presented studies on blood pressure and pulse changes but it is difficult to evaluate the work where such a variety of drugs was used. We recall that, of the 21 patients in which Flaxedil and Sodium Pentothal were used and blood pressure studies were made prior to the electroshock therapy, 5 were markedly hypertensive. Of these 5 hypertensives, 2 showed no significant drop in blood pressure while 3 sustained a marked drop. I believe that, of 5 hypertensive patients, if 2 show no significant drop in blood pressure following an intravenous injection of Flaxedil, Sodium Pentothal, and atropine, very little is actually proven especially where such a combination of drugs has been used. We may also recall that, in the over-all group of 21 patients, 16 did not show a significant drop in blood pressure and 2 showed a "slight consistent rise." Immediately after the strongly modified seizures, the blood pressure rose 40-60 mgs systolic and 10-30 mgs diastolic. Similar rises in blood pressure are reported in the 6 cases in which Syncurine was used. What this all amounts to is this: the blood pressure changes, despite the strongly modified seizures induced by either Flaxedil or Syncurine, are in no significant way different from changes observed in patients in which the seizure is entirely unmodified. In unmodified treatment we see this same thing, an initial rapid rise of blood pressure with a slower drop. In a series of 20 patients with blood pressure readings unmodified by any drug, we found the following: (1) Nearly all patients showed lower blood pressure readings on their wards than in the treatment room or on the treatment table. (2) Anxiety associated with the application of the electrodes to the head frequently, in itself, caused a rise of from 20-30 mgs. (3) Where such a rise had occurred, the

next measurable blood pressure reading after the seizure in about half the cases was lower. (4) Where the blood pressure did not seem to be elevated, in many cases, there was a rise of from 10-40 mgs that began to drop within 5 minutes. Therefore I cannot agree with the statements made that "the changes in blood pressure are considered significant, especially for patients with coronary disease" and that these "changes are distinctly less than when unmodified fits are produced."

We must also remember that any drug that impairs respiration either through laryngospasm or "histamine action," which both Sodium Pentothal and Flaxedil or Metubine Iodide and Syncurine may do, and in which respiration must be maintained by positive oxygen pressure for 4-8 minutes or longer, in itself adds to the cardiovascular-respiratory strain that may be considerably more of a hazard than a simple, unmodified treatment that lasts about one minute.

This brings me to my final point—the desirability of using such large doses of Flaxedil or Syncurine so as to produce such deeply modified seizures. In the hands of experts, Dr. Holt has demonstrated that it can be done safely—for people with less experience it can be a most hazardous procedure. It seems to me that, in the interest of safety, it should be reserved solely for cases in which a recent serious fracture or laceration is of such importance that such deep curarization is necessary. We must not forget that, although in 95% of patients Sodium Pentothal and the curare drugs cause no difficulties, there is a small percentage that is extremely sensitive to even much smaller amounts. Sodium Pentothal is a tricky drug and must be given well diluted and slowly. In our experience, in contrast to Dr. Holt's, we have had more untoward reactions with Flaxedil than with Metubine Iodide. In a series of 80 patients given Metubine Iodide about half with and half without Sodium Amytal or Sodium Pentothal, which included patients with a recent long bone fracture or healed long bone fractures or vertebral fractures or postoperative hip conditions and 7 patients between the ages of 70 and 84 with varying degrees of osteoporosis, we had only 1 severe reaction in which artificial respiration and oxygen were necessary. In none was there an aggravation of the pre-existing state. In 11 patients we have used Metubine in doses of 3-5 mgs while the patient was in insulin coma prior to electric shock administered for combined treatment. Here we also had 1 patient who on 3 occasions showed moderately severe respiratory embarrassment requiring artificial respiration and oxygen. In no case was the reaction so severe nor did it last so long as to require the use of prostigmine, in contrast to our former experience with d-tubocurarine, where it was so frequently necessary that we routinely gave it intravenously prior to the seizure in the manner described by Dr. Holt. Only one patient of the 80, after the first treatment, the amount of Metubine Iodide apparently insufficient, suffered a compressed fracture of 2 vertebral bodies.

Our experience with Flaxedil is more limited.

We have used it in only 12 cases but here, in contrast to Dr. Holt, we have had proportionately more severe reactions than with Metubine even though our maximum dose was 70 mgs—compared to 100 or more that Dr. Holt used. In 3 of the 12 patients, severe reactions were encountered. The first patient with 60 mgs of Flaxedil and 250 mgs of Sodium Pentothal developed such a complete death-like apnea and deep purple cyanosis that seemed interminable (actually about 6-8 minutes) that intubation became necessary. Another patient developed a somewhat milder but nevertheless severe collapse 10 minutes after the treatment was completed with only 50 mgs of Flaxedil and no Pentothal. A third patient also developed marked laryngospasm with only 50 mgs of Flaxedil and no intravenous sedative. Both of these patients required artificial respiration and oxygen.

Although in our experience we have found Metubine Iodide to cause less collapse reactions than Flaxedil, we feel that both of these curare-like drugs are a significant advance over d-tubocurarine, which should be given up for our purposes. Both Metubine Iodide and Flaxedil combined with intravenous sedation can be used to avoid many of the hazards and the repugnance that many patients have to the treatment.

DR. VIRGINIA APGAR (New York City).— Dr. Holt and his associates have presented an interesting paper, which indicates that Flaxedil in general is a more satisfactory relaxant than Syncurine in modifying electric shock therapy. This result agrees with our experience with their use in surgical anesthesia. The prompt and usually predictable action of Flaxedil and the lack of histaminic action outweigh the relatively unimportant tachycardia that occasionally occurs. It is comforting to have the antidotes prostigmine or Tensilon at hand for d-tubocurarine, tubarine, or Flaxedil, and shortly there will be available an antagonist for Syncurine. However, the use of relaxants is never without inherent danger; a recent report from Winnipeg tells of a patient in light surgical anesthesia who received 40 mgs. of Flaxedil and experienced many hours of complete apnea in spite of antagonists. The early symptoms of myasthenia gravis were not detectable until a small dose of this otherwise satisfactory relaxant was administered. One should not rely on antidotes to overcome the effects of extreme overdosage; it is far better to use a smaller dose in the beginning and have no need for an antidote.

Before proceeding to a discussion of general points, may we mention a few practical features? Hypotension and coronary insufficiency have been rightly ascribed to the use of Pentothal especially in older patients. In this country to produce unconsciousness for surgical anesthesia, 2½% Pentothal rather than 5% is used almost universally. In one large southern clinic, no concentration more than 0.4% is used to avoid the occurrence of these complications. It is possible that the use of 5 cc. of 2½% Pentothal given rapidly after the electrodes are put in place, with a pause of 30 seconds to reach the maximum circulation time to the brain

before the shock is applied, will avoid the appearance of hypotension. This total dose is 125 mgs. instead of 250 mgs. as quoted in this presentation.

If the intravenous use of Tensilon is planned, it is possible that the introduction of a vinyl plastic catheter through a thin-walled 18-gauge needle before shock therapy will obviate the displacement of a needle during the convulsion.

There is a new addition to the group of relaxants that may well supplant all those in current use: succinyl choline dichloride. A compound including succinic acid and two molecules of acetylcholine, its best feature is brevity of action which should commend its use to the psychiatrist. It is not antagonized by Tensilon, and its action is prolonged by prostigmine. It is miscible with Pentothal. Marketed in a concentration of 10 mgs. per cc., a dose of 30 mgs. would be an average for a middle-aged normal adult patient. A report appeared last month from England in which 3 patients who had received a single dose of 500 mgs. Pentothal, and 100 mgs. of "scoline" had prolonged apnea; it would have been surprising if prolonged apnea had not resulted.

The whole philosophy of shock therapy is intriguing to the anesthesiologist, whether convulsions are produced by insulin, metrazol, nitrogen inhalation, or by electrical methods. Apnea occurs in all cases with attendant rise in carbon dioxide, and fall in oxygen levels. Descriptions of brains of the rare fatal cases following ECT are similar if not identical to those following anoxic anesthetic accidents so well described by Courville, Schreiber, and others. The majority of reports relating to asphyxia at birth or after anesthetic accidents describe spasticity, athetosis, and mental deficiency as late central nervous system complications, but there are a few interesting exceptions; there are occasional reports of improvement in personality following an anoxic episode, and a recent paper states that superior intelligence was found in a small group of children who were known to be definitely asphyxiated at birth and who were resuscitated with difficulty. One wonders whether improvement following ECT parallels such reports.

In order to convince us that the changes noted following ECT are *not* related to anoxia from apnea or respiratory obstruction, 2 types of experiments are needed and, to the best of my knowledge, have not been carried out. (1) The convulsions should be produced in well-oxygenated patients. The present authors have made good advance in this direction by insufflating oxygen into the pharynx at the time of injection of Flaxedil, but 1 to 2 minutes are not enough to replace the nitrogen in the dead space of

the tracheobronchial tree. Five to 10 minutes of inhalation of a high oxygen atmosphere with a snugly fitting mask, and discarding the exhaled air, would be desirable before applying the shock. Objective measurements of oxygenation, such as a photoelectric cell or intra-arterial blood samples, are preferable to observance of skin color, for cyanosis is a most unreliable end-point. If mental improvement followed shock therapy so administered, anoxia would be ruled out as an etiological agent. (2) Electric shock therapy should be induced in a series of lightly anesthetized patients made completely apneic by the use of a relaxant, but with efficient ventilation maintained through an endotracheal airway, by manual or mechanical means. Such patients would not experience a convulsion, the importance of which is equivocal at present. If improvement should follow nonconvulsive shock therapy, the search for the true etiological agent would be narrowed.

In my ignorance about these matters, I am confused as to the use of Pentothal or Surital. In Dr. Holt's paper, most of the complications mentioned were associated with the anesthetic agent, not the relaxant. In questioning patients after recovering from shock therapy, it is apparent that the treatment is not painful. It is true that most patients are not enthusiastic about this form of treatment, but we are not dealing with an enthusiastic group of patients. There is very good logic in using a relaxant to minimize orthopedic complications, but I wonder why Pentothal is indicated. The reason for bringing up this point is that the trend in polypharmacy is a dangerous one. Pentothal, atropine, a relaxant, and an antidote plus electric shock increase greatly the possibility of innumerable complications. Recently, after a death in the operating room, we found the anesthetist had used 7 different drugs for one reason or another, and it was impossible to assign correctly the cause of death. If anesthesia and relaxation are both necessary, would not the use of one potent, nonexplosive anesthetic agent, such as trilene or even chloroform, be less complicated?

I personally feel strongly that anyone employing relaxants or other respiratory depressants should be thoroughly conversant with endotracheal intubation, whether by the nasal or oral route, by tactile methods or by direct laryngoscopy, but am aware that this is a minority opinion. May I urge those of you employing this useful method of treatment to get advice and instruction from your nearest anesthesiologist, who will be glad to cooperate.

EOSINOPHIL VARIATION IN THE COURSE OF INSULIN COMA THERAPY¹

HARLEY C. SHANDS, M.D.,² AND DORIS MENZER, M.D., BOSTON, MASS.

This paper is the report of a series of investigations centering around the changes in numbers of circulating eosinophils in the course of routine insulin shock therapy (ICT) in a group of hospitalized schizophrenic patients. We became interested in the relation between blood sugar and eosinophil levels several years ago when it was noted as a random observation that there seemed to be a reciprocal relation between the two in the course of an acute episode of experimentally induced hypoglycemia. When an opportunity presented itself for the further investigation of this relation in a group of patients undergoing ICT, we were surprised to find a persistent eosinophilia in many of them. This eosinophilia has been reported previously (1, 2), but it has apparently not been thoroughly investigated. As we proceeded in the project it became necessary to do a series of insulin tolerance tests (ITT) to provide a baseline of study and to provide a reproducible stress situation to test the effect of the ICT.

The results obtained permit the statement of 2 propositions as hypotheses, and the succeeding material will be evidence bearing upon these statements. In the first place, it appears that in these patients initially there is an orderly and meaningful relation between changes in the blood sugar level and changes in the level of circulating eosinophils when the blood sugar is artificially lowered by means of insulin; secondly, after the repeated exhibition of insulin in doses large enough to induce the development of profound coma, there is a disappearance of this orderly relation; in its stead, the eosinophilic response to hypoglycemia occurs as no response, *i. e.*, the eosinophil count tends to remain at the same level, or it occurs as an eosinophilia without a close or consistent

relation to the blood sugar level. Associated with the disappearance of orderliness in the eosinophil reaction to hypoglycemia there occur widespread alterations in the behavior of the patients during the test.

These results appear to us to be of potential importance in understanding the effect of ICT upon schizophrenic patients, in the elucidation of the mechanisms controlling the numbers of circulating eosinophils, and in relation to other conditions in which eosinophilia occurs.

METHODS

Selection of Patients.—In this hospital, patients tend to be selected for ICT after the selection of patients for individual or group psychotherapy and those for electric shock therapy. This method of selection leaves for the insulin unit a group of patients in whom the prognosis is relatively bad as compared with patients selected for ICT in some other hospitals (3). The group that has been investigated most intensively consists of male schizophrenic patients, aged 18-45, the majority showing predominantly paranoid symptoms. There was only one catatonic patient in the group. In addition, a much smaller number of observations have been made upon a group of 8 female patients in ICT.

Insulin Tolerance Test.—We have used a modification of the standard insulin tolerance test; in a series of preliminary tests it was found that there was a great variability with the usual dose, but that this variability could be reduced by an increase of dose to triple the usual amount, *i. e.*, to a dose of 0.3 unit per kilo of body weight. The times of sampling that appeared to give the most significant information about variations were 0, 20, 45, 90, 150, and 210 minutes; in some tests the determination at 150 minutes was omitted.

Insulin Coma Therapy.—In this hospital, the initial dose of insulin is 20 units, and the dose is rapidly increased by increments of

¹ Read at the 108th annual meeting of The American Psychiatric Association, Atlantic City, N. J., May 12-16, 1952.

From the Boston State Hospital, Boston, Mass.

² With the technical assistance of Gladys M. Howard.

20-40 units until a coma is reached; after initial induction of coma, a patient usually is given a series of 60 coma treatments; the treatments are given as a rule 5 days a week with a weekend rest.

Eosinophil Method.—For the most part the eosinophil counts have been done upon venous blood; where it was desired merely to follow a trend, as in weekly counts in patients over a long period, for the sake of convenience, the counts have been done upon capillary blood from a finger tip. We have been unable to determine any marked difference between the 2 techniques, but have used venous blood where there was any question of determining a trend and capillary blood for routine confirmation of the trend. We have used the modification of Randolph's (4) method described by Henneman (5), using a phloxine propylene glycol diluent. The technique followed is essentially the same as that recently investigated in detail by Bonner (6). Blood has been drawn to the 1.0 mark on the pipet, 2 pipets used, and 2 chambers charged from each pipet. The chambers have an area of 9 sq. mm. and a depth of 0.1 mm. The final counts on all 4 chambers have been added and multiplied by 100/36; or, to state it otherwise, the numbers of eosinophils in the 3.6 mm.³ of diluted blood have been counted.

Blood Sugar Method.—The routine method of Folin and Wu (7) was used.

RESULTS

The results are graphically shown in a series of figures, as follows:

A preliminary insulin tolerance test done by this technique is demonstrated in Fig. 1. It will be noted in this chart that at 20 minutes following the injection of insulin there is a drop (25%) in the eosinophil level and a drop (50%) in the blood sugar level. During this time the patient was somewhat drowsy but showed no other signs. In the next interval (20-45 min.), there was a great change: the blood sugar dropped a bit further, but there was a sharp rise in eosinophil numbers. The rise is of the order of the rise frequently obtained by us 15 minutes after the injection of moderate (0.6 mg.) dose of epinephrin in similar patients. Clinically in this period the patient complained of hunger

and showed much restlessness and sweating. These complaints then gradually subsided, and for the remainder of the 3½-hour test period he complained only of tiredness. At the end of the 3½ hours there was a return of the blood sugar level almost back to the control figure and a drop in eosinophils of about 80%; this drop is similar to that we have noted 3½ hours after the injection of a dose of ACTH (25 mgm.) in similar patients.

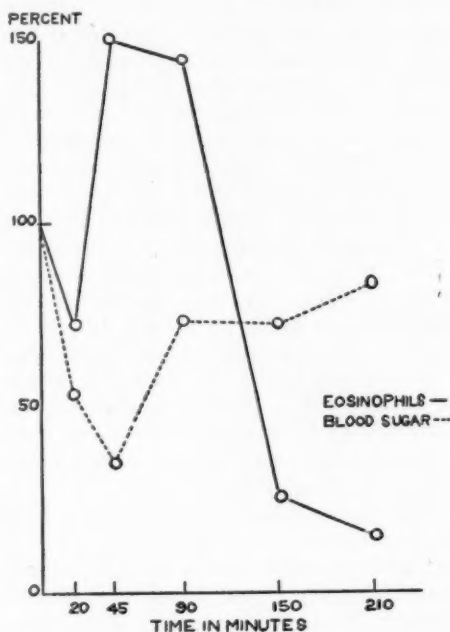


FIG. 1.—Insulin Tolerance Test. Chart demonstrates the orderly relationship between changes in the blood sugar level and in numbers of circulating eosinophils. All figures as percentage of initial levels.

Fig. 2. demonstrates the similarity in pattern in 5 patients who were tested with insulin in the manner described: the eosinophil levels are plotted on the left in absolute numbers and on the right in terms of percentage of the initial value. The orderliness of the response in these patients can be shown by means of the similarity in pattern in spite of greatly different initial levels of eosinophils. In a series of 11 ITTs, 8 of the patients showed curves of this form. The group of 3 patients whose initial eosinophil counts were less than 75 ("abnormal" by

the criteria of Kracke and Parker: 75-300 (8), of Thorn: 100-250(9), or of Laragh and Almy: 100-300(10) demonstrated relatively aberrant responses.

In Fig. 3 we have plotted the sugar and eosinophil in 8 ITTs at the 45 and the 210-minute points. On the left are the average values, to show the general tendency for the sugar to be lowest when the eosinophils are highest and vice versa. On the right the data are plotted simultaneously with sugar values

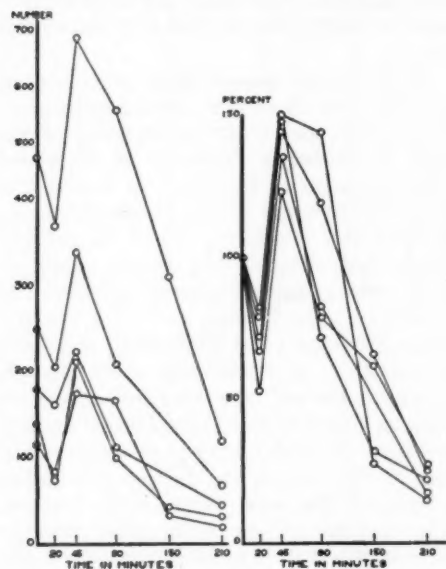


FIG. 2.—Insulin tolerance tests. The eosinophil values in tests of 5 subjects. On the left the data are expressed in absolute numbers; on the right as percentage of the initial figure. Note the parallelism when all figures are expressed relatively.

related to eosinophil values without reference to time. The X in each case represents the averages shown on the left-hand chart. By means of the separation of the whole area into quadrants, it may be demonstrated that all data fall into what may be called the "Increase-Decrease" and "Decrease-Increase" quadrants, none into the "Increase-Increase" or "Decrease-Decrease" quadrants; this type of grouping by quadrants is a rough measure of the statistical significance of the difference observed, and such a complete restriction of all data into the 2 complementary quadrants tends to support the idea that this is an orderly relation.

In the first 3 figures we have attempted to show in summary that the response to insulin in this dose in a series of hospitalized schizophrenic patients is an integrated patterned response; within the group of 11, consistent as a whole, there is nevertheless a small group of 3 patients who show a relatively aberrant response in this test situation; in these patients the resting eosinophil level falls below a generally accepted normal minimum count.

In Fig. 4 we have compared the responses of 9 of these patients to the preliminary ITT and to a single coma treatment in the course

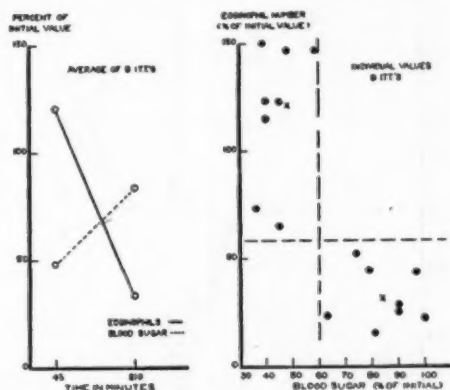


FIG. 3.—Insulin tolerance tests. Charts to demonstrate the reciprocal relation between blood sugar and eosinophil levels: highest eosinophil and lowest sugar levels at the 45-minute mark; highest sugar and lowest eosinophil levels at the 3½-hour point. On the right, the individual figures plotted against each other: the division into quadrants indicates there is no overlapping between the figures at the different times.

of ICT. On the left are compared the resting eosinophil level on fasting patients in the early morning; the range is restricted in the patients before the ICT has been instituted, but there is a marked scattering of the initial levels in those determinations taken during the course of ICT—the highest level on this chart is 1,140 cells/mm.³ compared with a control level of 160, but other determinations taken later attained even higher figures. On the right are compared the eosinophil levels as percentage of the initial figures in the preliminary ITT and in the later coma day; there is a very marked grouping in the former, and a marked scat-

tering in the latter. These results are perhaps not directly comparable because in the ITT the dose of insulin is approximately 20 units given intravenously, in the coma day the dose approximately 100-200 units given intramuscularly. However, the scatter in the latter test is impressive when it is considered that the larger dose might be reasonably expected to lead to a greater eosinopenic effect than the smaller.

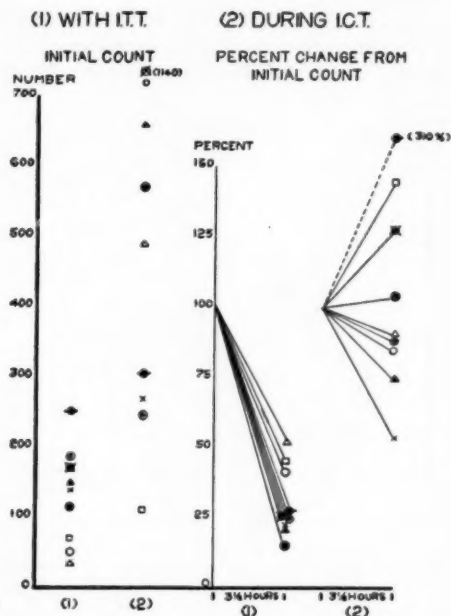


FIG. 4.—Disorganization in the course of ICT. On the left of each pair are figures from ITT; on the right figures from ICT. Note that all control ITT figures are less than 300, while during ICT the baseline figures vary up to 1,000; the response to insulin in the ITT is an average drop of 69%; in ICT the response is random, on the average a rise.

Because of this difference in technique we have repeated the ITT on 5 patients toward the end of their course in ICT, and these results are presented in Fig. 5. This chart shows the 5 ITT tests before and after ICT, and in the lower right-hand corner we have presented the results of ACTH tests done on 4 of these 5 patients. Each of the pairs of smaller charts shows the preliminary and subsequent tests side by side for comparison. Instead of the well-marked pattern seen in

the first series, in the second the eosinophil level in 3 patients (RH, EH, DO) remains essentially unchanged, in one patient (GM) there is a rise in eosinophil count, and in the fifth (SM) there is, after an initial period of no change, an eosinopenia of approximately the same extent as on the initial test. It may be noted in this latter patient that he is one of the aberrant 3 mentioned above with a low resting eosinophil count; on the preliminary test the most striking finding was the pronounced early fall in eosinophil count, a finding that is absent in the second test.

In all of the second series as compared with the first there is a marked increase in resting eosinophil level. In the second series there is further a difference in the blood sugar response in that there is a relatively delayed but greater degree of hypoglycemia; there is also a delayed rise in all patients except SM. During the second series of ITTs, there was a marked difference in clinical response in these patients. The patients were placid and unresisting; there was no sweating, no restlessness except in one patient at the end of a long period of time lying on a hard table, no complaint of anxiety and none of hunger, even to direct questioning. In this respect the difference from the behavior of the same patients in the first test was extreme. Comparable pulse tracings were obtained in 2 patients throughout the first 1½ hours in both tests; in the first, patient RH showed at 0, 30, 60, and 90 minutes respectively pulse rates of 78, 78, 75, and 60, while in patient GM similar samplings showed rates of 78, 99, 79, 72; in the second series at the same times, RH has rates of 51, 54, 54, and 60, GM those of 63, 60, 60, 63.

We were able to obtain EEG records in some of the first and some of the second series; in 3 patients records from both tests were available. Because of technical difficulty, only qualitative impressions can be reported: It was noted that the second series of records demonstrated more slow activity for longer periods and there was much less interference from scalp muscle activity in the later test.

The chart at the lower right-hand corner of Fig. 5 demonstrates the degree of eosinophil responsiveness in these patients to the

standard (25 mgm.) test dose of ACTH. It will be noted that at a time when eosinopenia as an end result of hypoglycemia is conspicuous by its absence in 3 of these patients, there is a normal or very nearly normal response to ACTH, indicating the maintenance of the functional capacity of the

seen that the former patients show a very restricted distribution with the highest count occurring at 330 cells/mm.³, whereas the latter patients show a very much more diffuse distribution.

In Fig. 7 we have plotted the averages of 265 eosinophil determinations on 27 male

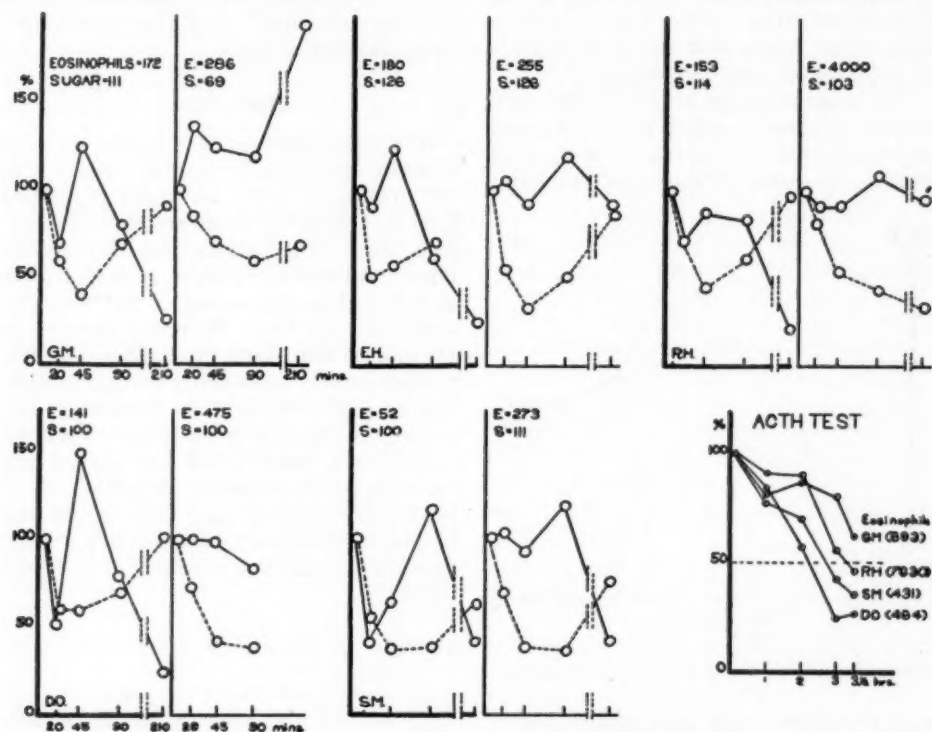


FIG. 5.—ITT results in 5 patients prior to (left) and subsequent to (right) a course of ICT. In lower right-hand corner are charted ACTH tests on 4 of these 5 patients.

adrenal cortex to induce an eosinopenic response.

Fig. 6 is a comparison of distribution curves; the data show (solid line) the distribution of 333 eosinophil counts taken routinely, on 9 patients in the early morning while fasting, followed for several months in the hospital while undergoing group psychotherapy, and (broken line) the distribution of 365 eosinophil counts of 34 patients (27 men, 7 women) taken on random days at more or less weekly intervals at a time just prior to the termination of treatment on the given morning (*i. e.*, at the time presumably of most severe hypoglycemia). It may be

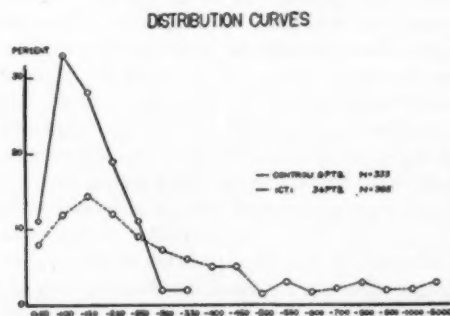


FIG. 6.—Distribution curves to demonstrate the randomization of eosinophil numbers encountered in the course of ICT.

patients grouped by 10-day periods through the course of ICT. Coma first appeared on the average on the twelfth day of treatment (noted by the arrow). The first 10-day period is of considerable interest since it demonstrates that the eosinopenic effect that is so prominent in the preliminary tests tends to disappear early in the course of ICT. This effect appears to be separate from the eosinophilia effect, which tends to occur later, in the period after coma is induced.

This separation can be seen with equal clarity in the way in which the whole group may be divided. The group of men, 27 in number, who were followed for sufficiently

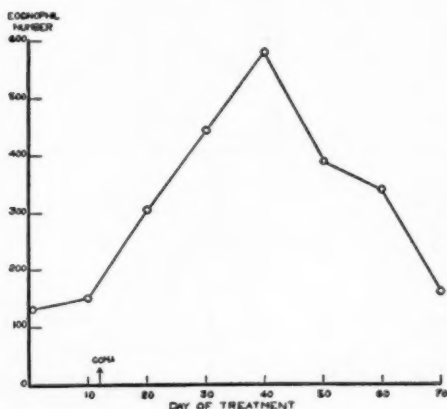


FIG. 7.—Average course of eosinophil numbers in the course of ICT: 265 counts on 27 patients.

long periods to permit our statements to be made with confidence, may be divided into 2 subgroups on the basis of highest level of eosinophil count observed: in the smaller group of 10 men the highest eosinophil count observed was 303 cells/mm.³, whereas in the larger group of 17 men the highest count observed was in the 5,000+ level. We have based the division upon the frequently given upper level of "normal" for the eosinophil count and upon the observation that the smaller group seemed to have a definite ceiling at 300 cells. A remarkable coincidence was noted in that the 3 patients in the smaller group who were classed as showing "excellent" immediate results had ceiling eosinophil counts of 284, 294, and 297 cells. In the larger group there were also 3 patients classed as showing "excellent" immediate

therapeutic results, with scattered maximum levels of eosinophils. We do not feel that this small series permits us to say anything about the prognostic significance of the occurrence or nonoccurrence of eosinophilia; formerly we hoped that this would be the case, but the evidence is not now very convincing. Moreover, some patients classed as showing "excellent" results have shown relapses in a few months.

DISCUSSION

The data reported above appear to us to warrant discussion in several contexts. In the first place, it may be demonstrated that after ICT there is a disintegration in the delicate homeostatic balance that controls the relation between blood sugar, eosinophil level, and clinical manifestations of the "hypoglycemic reaction" (11). Secondly, as noted at the end of the section just above, the data provide certain hints about the mechanisms that are involved, first, in decreasing and, second, in increasing eosinophil numbers. Finally, in a rather speculative way we may make certain hypothetical suggestions as to the manner in which these observations may be integrated with other material in the literature and with the clinical picture of emotional illness.

THE DISINTEGRATION IN HOMEOSTATIC BALANCE

In the ITT series done before the institution of ICT, the reaction to the rather large dose of insulin given intravenously is an orderly response, with a series of changes that succeed each other in what appears to be a meaningful way. In brief, these changes are: (1) A short period (20 min.) in which there is a fall in the blood sugar of a relatively mild degree, accompanied by a fall in eosinophil numbers; this appears to us to be a stage of "conservation," in which the organism attempts to cope with the problem by inaction. (2) The second stage (20-45 min.) is one of intense activity; the blood sugar falls a bit further, but this fall is apparently a drop past a threshold of activation of the autonomic nervous system: the effects noted are restlessness, anxiety, complaints of hunger, sweating, tachycardia, and a considerable

rise in eosinophil numbers. We interpret this stage as one of mobilization of resources. (3) In the immediately succeeding period (45-90 min.), this mobilization appears to attain success in neutralizing the threat of hypoglycemia, since the blood sugar rises a bit and the clinical manifestations disappear. We interpret this finding as the result of glycolysis (primarily an epinephrin effect) (12) in increasing the amount of available glucose. (4) In the terminal period (90-210 min.), there is a further rise in blood sugar to or toward the initial level, and there is a marked drop in eosinophil numbers; the complaint made by the patients in this period was one of tiredness ("I feel like I have done a week's work"). We interpret these events as those that accompany restitution of sugar and glycogen supplies by means of gluconeogenesis.

The early excitement effects appear to be due to activity in the autonomic nervous system and adrenal medulla, and the latter phases appear to be related to activity in the pituitary-adrenocortical stress mechanisms, with the eosinopenia the result of activity of glucocorticoid hormones from the adrenal cortex (12). It is a demonstration of the peculiar precision and condensation of the homeostatic mechanisms that the activation of the autonomic nervous system serves several functions: (1) There is a communication effect both in the development of hunger and in the precipitation of the state of anxiety and restlessness—both inform the patient, and the latter informs an outside observer, that a state of danger exists; (2) there is a direct restorative effect in that the glycolysis attributable to epinephrin raises the blood sugar immediately; and (3) there is a long-term restorative effect in the activation of the pituitary-adrenocortical system, an effect again attributable to the action of epinephrin.

In the ITT series carried out while the patients were in the latter half of ICT, the picture is entirely different. The most striking and significant change is a marked dissociation between alterations in the blood sugar on the one hand and the clinical manifestations and eosinophil changes on the other. A more pronounced and prolonged (though relatively somewhat delayed in on-

set) hypoglycemia is no longer signalled by any signs of distress. Close to a dangerous level of hypoglycemia (30-40 mgm./100 cc.) these patients appeared wholly unconcerned. In the later test the technical procedures were much simpler; the patients made no demands and were quiet and placid. Their physical appearance was greatly changed; all the patients had gained weight and were more composed.

In this latter series the eosinophil behavior is also remarkably different; whereas all of these patients had previously demonstrated major shifts in eosinophil levels with a terminal eosinopenia of more than 50% in all, in the second series only 1 of 4 showed an eosinophil drop at 210 minutes, and in this one the prior mobility in the initial test is quite different from the fixed level in the first 3 determinations in the second test. In Fig. 4, it may be seen that the eosinophil response to a single coma treatment is similar, in that only one of the group of 9 patients exhibited a drop of approximately 50%, the other relative eosinophil counts ranged from about 70% of the initial figure upward to 300%, at a time when the initial figure itself was much greater than in the preliminary determinations.

On the basis of these observations it is possible to make the interpretation that the difference between the patients prior to and subsequent to a prolonged series of hypoglycemic comas is that in the latter case the danger (a restriction of the amount of glucose available for metabolic processes) is (1) not announced or signalled, either to the patient himself or to the clinical observer, and (2) is not reacted to by means of immediate or secondary homeostatic reparative devices.

In spite of the dissociation in function demonstrated by these results the patients were in more complete control of overt behavior than previously; from the standpoint of hospital personnel, there was a great improvement in the manageability of the patients, even where there was little or no change in such schizophrenic manifestations as seclusiveness, delusional ideas, etc.

The clinical condition of these patients bears a close resemblance to the state manifested by the cats sympathectomized by Can-

non(13). His comments on these cats are pertinent:

The first fact which strikes the observer is that the sympathetomized animals continue to live without apparent difficulty. . . . The results which I have just reported may seem more impressive because of the slight effects resulting from removal of the sympathetic system than because of actual deficiency phenomena. It must be admitted, however, that the slight effects may be misleading. The animals, to be sure, continued to live, but they live in the protected confines of the laboratory where there are no marked temperature changes throughout the year and no necessity to struggle for food, no requirement to escape from enemies, no danger of hemorrhage.

CONTROL OF EOSINOPHIL NUMBERS

Inspection of the details of the data collected in this project leads to the making of certain statements about the control of the numbers of circulating eosinophils; we may add to these statements with other evidence from the literature.

In those patients whom we have followed from the beginning of the ICT, it may be seen upon plotting the individual results that the first 2-3 days are characterized by eosinopenia, then there is a flattening of the eosinophil curve near the control level, and then around the time of the first coma there occurs in most of the patients a marked rise in the eosinophil level above the 300-cell ceiling. In the composite picture of all the results, Fig. 7, it may be seen that in the first 10-day period the counts are on the average about the same as the control level, and a major rise occurs in the second 10-day period; the onset of coma in the whole series was on the average on the 12th day of treatment.

From these observations it would appear that the eosinophil-decreasing and eosinophil-increasing mechanisms are separable, and they may be treated for purposes of discussion as distinct entities. A reasonable guess is that there is a homeostatic mechanism concerned with maintaining the level of circulating eosinophils constant below 300 cells/mm.³, and in addition to a mechanism that operates to decrease eosinophil numbers in the course of the reaction to stress. The latter (decreasing) mechanism appears to be more sensitive to impairment than does the former (maintaining) mechanism. In the presence

of increasing (subcoma) doses of insulin in the first 10 days of treatment, the eosinophil-decreasing mechanisms are rendered inoperative, whereas following the exhibition of insulin in traumatic (coma) doses, there is in the majority of these patients an impairment of the eosinophil-maintaining mechanism of an extent sufficient to permit loss of control of eosinophil numbers with a consequent eosinophilia.

There is a good deal of evidence to indicate the possibility that impairment in central nervous system function of a mild type is frequently associated with a decreased sensitivity in eosinophil-decreasing mechanisms. In experimental animals, for instance, the state of vigilance associated with full consciousness leads to an eosinopenia from the situation of being handled; but when such an animal is given a small dose of an anesthetic agent, the vigilance is diminished, the animal easier to handle, and the eosinopenic response is avoided, in spite of the fact that the response of the animal to an agent such as ACTH will at the same time be unimpaired(14). There is a little evidence from human beings that also bears upon this problem. Godlowski(15) reports that the rise in eosinophil count in the first 2 hours of sleep is rapid; McArthur(16) noted in one case observed around the clock that there was a considerable increase in eosinophil count in the middle of the night. Work of several years ago in following the diurnal course of lymphocyte counts (reported by the Worcester group(17)) showed that the highest count was to be expected at the 2 a.m. reading. Since there is a tendency for the lymphocyte and eosinophil counts to resemble each other in direction of change, this finding in a general way supports the 2 previous observations.

The eosinophil-decreasing mechanism appears to be attributable to the operation of the pituitary-adrenal cortex system, or, at least, the operation of this system uniformly induces an eosinopenia along with a number of other effects. The trigger for activation of this system, or at least a possible trigger, is the action of epinephrin upon the pituitary (12). The reduction in vigilance that can be induced by an anesthetic agent appears to be analogous to the reduction in vigilance

induced in these patients at the end of a long series of ICT treatments, and in both instances there is a diminution in clinical signs of alarm and a subsequent absence of the eosinopenic response.

The mechanism of the eosinophilia appears more obscure; from these data we have the impression that such a response represents an "escape" phenomenon—in very severe traumatic disorganization in the central nervous system the mechanism maintaining the "ceiling" of eosinophils fails in its function and allows a primitive eosinophil-increasing mechanism to operate unchecked. Why this should occur in certain patients and not in others is mysterious, since there are no demonstrable differences in insulin dose, insulin resistance, age, length of treatment, or any other factors between the 2 groups.

By far the most reasonable explanation of this eosinophilia is that it represents an allergic response. The eosinophilia in allergic diseases and in trichiniasis is well known; other recent reports of the occurrence of eosinophilia include patients recovering from severe burns (18) and patients treated with pig ACTH (19)—in this series patients treated with ACTH from sheep and whale pituitaries did not develop an eosinophilia. All these observations, including this of ours, refer to the occurrence of severe trauma in the presence of a foreign protein substance. Against this thesis in the patients reported here are several facts: an incidence of allergy in over two-thirds of a series of 34 patients is remarkably high, especially in the absence of any clinical manifestations of an allergic condition in any patient in the entire course of ICT (2 of the patients had a prior history of allergy, but neither of them manifested symptoms during ICT), and the disappearance of the eosinophilia at the end of the treatment period while the plan of treatment is as yet unaltered seems to mitigate against the view that this response is allergic in nature. We are forced to leave this question in abeyance.

GENERAL IMPLICATIONS

Whenever we have discussed this material, there has immediately come up the problem of whether the loss of the homeostatic mechanisms in these patients treated by means of

repeated hypoglycemic comas represents an adaptation to the situation or a failure of adaptation. It seems that the only possible answer is that the goal of adaptation must be included in the question; depending upon the goal, the situation found here represents either adaptation or the reverse. Specifically, it appears that a patient in whom the autonomic response and its sequelae are in good working condition is able to make a relatively rapid adjustment to a stressful situation, at the expense of effort and subjective discomfort. On the other hand, a patient faced with the traumatic situation of hypoglycemic coma (we define traumatic here as a situation in which the patient is helpless since a patient deep in insulin coma is helpless to bring himself out of it without outside aid) will survive longer if he husband the limited resources left to him and avoids the expenditure of energy involved in the muscular and glandular concomitants of activity in the danger-signalling system.

These considerations bring up the interesting problem of the price of homeostasis. For the most part, in an adult human being, the operation of homeostatic devices requires such a relatively small part of the total energy supply of the organism as to be negligible; only in a situation of extreme or prolonged alarm or where the resources are very much limited does the energy used by the danger-signalling system itself become of major importance. We believe this difference to be demonstrated in the second series of ITT results by the definite tendency for the hypoglycemia and the slow activity in the EEG to be greater in extent though delayed in onset, *i. e.*, the individual tends to use less of the limited resources when he is not aware, through his own automatic behavior, of the presence of a danger, but when the dissociation between cognitive and danger-signalling systems has been accomplished, the patient has less ability to compensate for the danger. Parenthetically we may note here on the basis of an observation on one relapsed patient that the re-institution of ICT within 6 months of the patient's discharge reproduced the autonomic signs of hypoglycemia, so that the effect described appears to be limited in duration.

The evidence that we have presently avail-

able does not allow a full discussion of the theoretical possibilities inherent in this material; however, in a speculative way we would like to point out that these observations are consistent with certain hypotheses advanced by others previously. We think it possible that the dissociation between cognitive system and danger-signalling system represents a failure in internal communication, which reproduces a condition of disintegration present earlier in the history of the organism. This idea derives from Cannon (13), who pointed out that there is "... an absence or deficiency of homeostatic regulation in babies during a considerable period after birth [with] later rather slow acquirement of control." The return to a state of previous adaptation is consistent with the idea of regression, and specifically with the hypothesis advanced by Hendrick (20) dealing with the ideas of "physiological infantilism" and "physiological regression." We hope that further investigation will shed more light upon this problem.

SUMMARY

We have investigated the numbers of circulating eosinophils in schizophrenic patients in relation to the hypoglycemia induced by the injection of insulin before, during, and after a routine course of insulin coma therapy. In the period prior to ICT, these patients demonstrate an orderly relation between these 2 indices of function, and this relation is meaningful in the light of the clinical manifestations noted. In the course of ICT there is a loss of the eosinophil-decreasing effect of hypoglycemia in all patients, and in two-thirds of the group there is in addition a considerable eosinophilia. Subsequent to ICT, there is a dissociation

between eosinophil numbers and blood sugar level and a very pronounced lack of clinical response in the face of more severe hypoglycemia. The possible significance of these results is discussed.

ACKNOWLEDGMENTS

We wish to express our deep appreciation of the cooperation given us in this study by the personnel of the insulin units, especially Dr. Ruth Ehrenberg and Miss Mary Butler. The ACTH used in the study was furnished by Armour and Co.

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NEW DRUGS IN THE TREATMENT OF PETIT MAL EPILEPSY ¹

FREDERIC T. ZIMMERMAN, M.D., NEW YORK, N. Y.

STATEMENT OF THE PROBLEM

The need for a wider armamentarium of compounds effective in petit mal epilepsy has long existed. The problem is particularly pertinent because of the prevalence of the petit mal type of seizure among children and the inability to date of petit mal drugs to reach the adequacy attained by anticonvulsants effective on the grand mal type of seizure.

The bromides are no longer judged to be adequate because of the high incidence of bromide poisoning, skin rash, dulling of the mental processes, etc. Although phenobarbital is still used extensively for this type of seizure, it also produces in many cases a sedative effect, with dulling of the mental processes and drowsiness. Mebaral has the same barbiturate action.

Tridione, the newest of the petit mal drugs, works well generally so far as reduction or control of seizures is concerned, but often has the disadvantage of producing concomitant untoward side effects such as photophobia, rash, and leukopenia.

We are faced therefore with the necessity of finding an anticonvulsant for petit mal that achieves a maximal degree of success in reducing or controlling seizures and at the same time shows a minimal percentage of undesirable side reactions. Efforts in this direction rest heavily upon the fact that many known anticonvulsants and/or sedatives have a certain chemical complex, the chemical molecule almost always containing this particular complex.

If, for example, one examines all the known anticonvulsants as well as hypnotics, he will find that structure I (Fig. 1) occurs quite frequently as part of the compound, which may be an open chain or a heterocycle. Some examples are II (Dilantin), III (Mesantoin), IV (Tridione), V (Phenobarbital), VI (Phenurone), and VII (Cabromal). That the succinimides fit into this general scheme

is shown by structure VIII. We therefore developed a systematic experiment to determine which of the drugs supplied to us would give a high percentage of anticonvulsant reaction in human subjects combined with minimal side effects, after chemical synthesis and animal experimentation had been completed.

RATIONALE OF LABORATORY METHOD OF PRODUCING SEIZURES

In the study of grand mal seizures Merritt and Putnam(1) have demonstrated the value of laboratory experiments in testing the effectiveness of drugs having a high degree of protective action against electrically induced convulsions in animals, in order to ascertain whether they could be considered appropriate for clinical use in patients subject to convulsive seizures. These studies involve the use of electrodes placed upon the skull of the animals (cats) over which an electric current is passed from a flat metal plate on top of the skull to a stout wire bit placed in the mouth of the animal. In their experiments the intensity of stimulation was measured in milliamperes and was fairly constant. By this method they were able to produce a convulsive seizure similar to a grand mal seizure in a human being and were also able to ascertain the convulsive threshold of the animal just prior to the administration of a chemical compound. Following absorption of the drug the cat was given another shock in order to determine the effect of the compound upon the convulsive threshold. If more current was needed to produce the retest seizure, some degree of anticonvulsant protection could be assumed on the part of the given drug.

Metrazol shock has also been used in the production of seizures. It must be remembered, however, that if a particular drug does not protect an animal from electro- or metrazol-induced seizures, the conclusion cannot be drawn that the drug is not a good anticonvulsant. Only when results are positive is the technique of shock suitable for screen-

¹ Read at the 108th annual meeting of The American Psychiatric Association, Atlantic City, N. J., May 12-16, 1952.

Chemical compounds, on the other hand, are sometimes found that cause a high threshold for convulsive shock and at the same time are successful in reducing the petit mal type of seizure. The succinimide group (Fig. 1), for example, shows a surprisingly high degree of activity in preventing metrazol-induced convulsions and the convulsions in petit mal.

MATERIALS AND METHODS

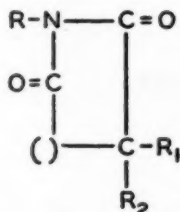
The approach to the problem therefore was to screen chemical compounds that were known to cause a high convulsive threshold in animals by determining how well they met the criteria in human beings of seizure-reduction or control with minimal side effects.

This work is being carried out in the Vanderbilt Clinic and the division of child neurology of the Neurological Institute. The cases sought were those in which the seizures were either intractable to standard anticonvulsant drugs, gave a toxic response to such drugs, or both. Although confirmation of the clinical diagnosis was always sought by electroencephalogram, cases that fulfilled the recognized clinical criteria of petit mal were not discarded when the spike-to-wave complex was absent.

The number of attacks was recorded by the parents on a daily calendar chart, and these data were then transcribed to a duplicate chart for graphing when the patient returned to the clinic. It was believed that this method would provide an accurate means of evaluating a drug.

RESULTS

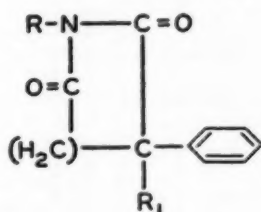
We began with chemical compounds having elements similar to the basic pattern (Fig. 1, Structure 1), namely,



$\text{R}, \text{R}_1, \text{R}_2 = \text{H, alkyl, aryl}$

Previous compounds tested included samples of the piperidine group, thiazolidone, and furanacrylamide, but were predominately of the cinnanamide type. Almost all these compounds, however, have common toxic manifestations that limit their usefulness, and no drug of the cinnanamide group met our original criteria of maximal seizure reduction with a minimum of toxic effects.

For this reason we decided to sample the succinimide compounds. As was previously stated (Fig. 1, Structure VIII) the basic structure for the succinimides is as follows:



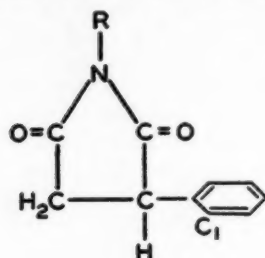
Investigation of the anticonvulsant properties of the succinimides has now been under way for many months. Tables 1 to 6 inclusive reveal the technique of systematic chemical substitutions in the molecule with the resultant effectiveness in terms of protection against metrazol-shock. 1+ indicates a delay in onset of the convulsion while 4+ means that the particular drug gives complete protection to a group of 5 rats at the dose given in milligrams per kilogram.

Table 1 shows the degree of protection against convulsive doses of metrazol in the first group of succinimides, and the succeeding Tables 2 to 6 inclusive pertain to the remaining succinimide groups. Since tridione does not give complete protection below 500/mg./kg., results indicate that these compounds are more active in the animal tests.

CLINICAL RESULTS

Those drugs that indicated the greatest degree of protection against metrazol shock with animals were tested clinically. Results are shown in the Tables 7-11. It may readily be seen that some of the succinimides, namely, PM 338, PM 396, PM 397, and PM 441, gave a considerable degree of reduction in seizures, but failed in general to satisfy

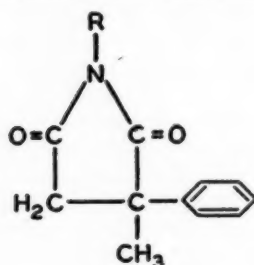
TABLE 1

DEGREE OF PROTECTION AGAINST METROZOL IN
FIRST GROUP OF SUCCINIMIDES

R	Activity, mg./kg.	PM No.
H	4+/250 +/125	351
Methyl	4+/125 +/65	334 *
Ethyl	3+/250 +/125	347
Allyl	4+/125 +/65	338 *
Isopropyl	3+/250 2+/125	316
Sec-Butyl	3+/250 2+/125	327

* Drug tested clinically.

TABLE 2

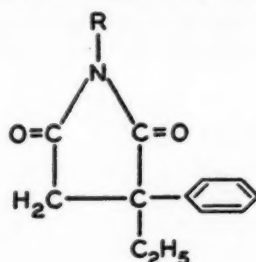
DEGREE OF PROTECTION AGAINST METRAZOL IN
SECOND GROUP OF SUCCINIMIDES

R	Activity, mg./kg.	PM No.
H	4+/65 +/32	397 *
Methyl	4+/65 3+/33 +/16	396 *
Ethyl	4+/65 +/33	412
Allyl	4+/125 2+/65	431
Propyl	4+/125 3+/65	413

* Drug tested clinically.

TABLE 3

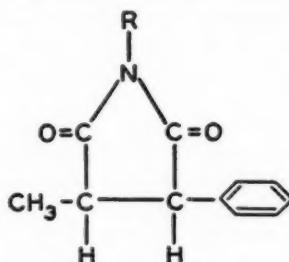
DEGREE OF PROTECTION IN THIRD GROUP



R	Activity, mg./kg.	PM No.
H	4+/65 3+/33 2+/16	449
Methyl	4+/33 +/16	450

TABLE 4

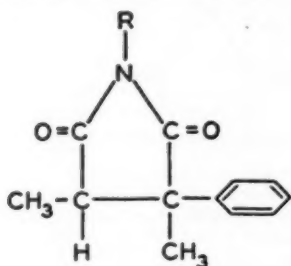
DEGREE OF PROTECTION IN FOURTH GROUP



R	Activity, mg./kg.	PM No.
H	4+/65 3+/33	440
Methyl	4+/125 3+/65 +/33	420
Ethyl	4+/125 +/125	442
Allyl	4+/125 2+/65	443
Isopropyl	4+/250 3+/125 2+/65	444

TABLE 5

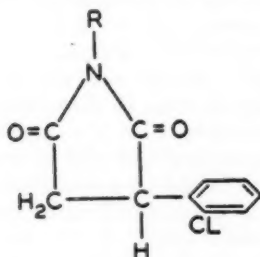
DEGREE OF PROTECTION IN FIFTH GROUP



R	Activity, mg./kg.	PM No.
H	4+/33 3+/16	455
Methyl	4+/33 2+/16	451
Ethyl	4+/250 2+/125 +/65	454

TABLE 6

DEGREE OF PROTECTION IN SIXTH GROUP



R	Activity, mg./kg.	PM No.
H	4+/65 3+/33	451 *
Methyl	4+/500 2+/250	415

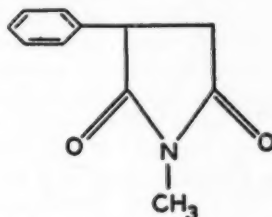
* Drug tested clinically.

TABLE 7

RESULTS WITH PM 334

(Chemically designated as N-methyl-a-phenyl-succinimide)

Chemical structure:



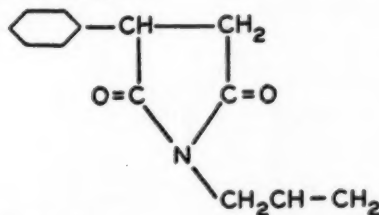
Number of cases	100
Average number of seizures per week previous medication	80
Average number of seizures per week on drug	14
Percent reduction in seizures	82
Average daily dose in grams	2.7
Duration of treatment (weeks)	24
Percent complete control	21
Percent practical control (80-99%)	28
Percent partial control (5-79%)	32
Percent no effect (0-4%)	15
Percent worse	4
Percent toxic	5

TABLE 8

RESULTS WITH PM 338

(Chemically designated as N-allyl-a-phenyl-succinimide)

Chemical structure:



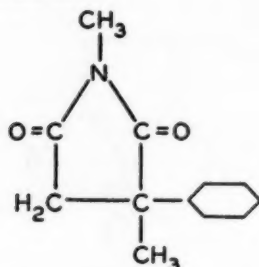
Number of cases	14
Average number of seizures per week previous medication	86
Average number of seizures per week on drug	33
Percent reduction in seizures	60
Average daily dose in grams	0.8
Duration of treatment (weeks)	4
Percent complete control	28
Percent practical control (80-99%)	44
Percent partial control (5-79%)	28
Percent no effect (0-4%)	0
Percent worse	0
Percent toxic	28

TABLE 9

RESULTS WITH PM 396

(Chemically designated as N-methyl-a, a-methyl-phenylsuccinimide)

Chemical structure:



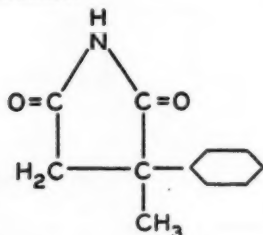
Number of cases	11
Average number of seizures per week previous medication	110
Average number of seizures per week on drug	44
Percent reduction in seizures	60
Average daily dose in grams	0.6
Duration of treatment (weeks)	12
Percent complete control	27
Percent practical control (80-99%)	18
Percent partial control (5-79%)	37
Percent no effect (0-4%)	9
Percent worse	9
Percent toxic	9

TABLE 10

RESULTS WITH PM 397

(Chemically designated as a, a-methylphenyl-succinimide)

Chemical structure:



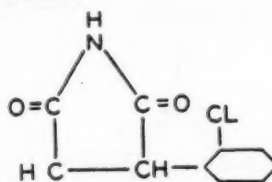
Number of cases	36
Average number of seizures per week previous medication	90
Average number of seizures per week on drug	40
Percent reduction in seizures	56
Average daily dose in grams	0.6
Duration of treatment (weeks)	10
Percent complete control	17
Percent practical control (80-99%)	20
Percent partial control (5-79%)	41
Percent no effect (0-4%)	5
Percent worse	17
Percent toxic	20

TABLE 11

RESULTS WITH PM 441

(Chemically designated as a-(c-chlorophenyl)succinimide)

Chemical structure:



Number of cases	23
Average number of seizures per week previous medication	88
Average number of seizures per week on drug	27
Percent reduction in seizures	69
Average daily dose in grams	0.6
Duration of treatment	11
Percent complete control	0
Percent practical control (80-99%)	0
Percent partial control (5-79%)	67
Percent no effect (0-4%)	33
Percent worse	0
Percent toxic	0

our original criteria for a variety of reasons. In some instances the percentage of complete control and practical control was relatively low, while in others this requirement was met but the frequency and nature of toxic side effects seemed to contraindicate further experimentation. On the positive side, it must be said, however, that all these drugs in the succinimide group have the advantage of possessing a relatively low dosage level.

To date N-methyl-a-phenylsuccinimide (PM 334) is the most effective succinimide we have tested; 81% of the cases were helped. The duration of treatment of PM 334 ranges from 4 to 104 weeks, with 5 of the patients having been completely free from seizures for over a year now.

It should be added, however, that our criterion of complete control is a very rigid criterion by which to judge the effectiveness of medication, since it is rare that individuals suffering from seizures remain seizure-free over long periods of time, and in the case of PM 334 we have had to revise our figures downward from time to time. Table 12 shows the revision in percentage of complete control as the time interval was extended.

TOXIC SIGNS

On PM 334, 5% of our patients showed toxic signs (Table 13). This is in marked contrast to the toxic signs in 55% of cases

TABLE 12

PM 334—COMPLETE CONTROL

Date	Cases completely controlled
2/51	30
7/51	27
12/51	24
5/52	21

TABLE 13

TOXIC SIGNS WITH PM 334

Nausea and vomiting	2
Drowsiness	2
Reddening of skin	1
Photophobia	1
Pains in stomach	1
Dizziness	1
Itching	1
Loss of appetite	1

reported for tridione. The toxic signs are also much less disturbing than those seen with tridione.

Our data thus appear to show that PM

334 is equal, if not superior, to tridione in therapeutic effect in the group studied and that it has the advantage of being relatively nontoxic. In our experience N-methyl-a-phenylsuccinimide has proved more efficacious in that group of cases in which standard medication gave only indifferent-to-fair results, as well as in those cases having the lowest frequency of pretreatment seizures.

Additional compounds of the succinimide group are likewise being tested at present, but sufficient data are not yet available for presentation. The experiment will, no doubt, continue for several years in the hope of finding a drug that is still more efficacious than even the present promising drug. It is likewise our hope to learn some basic information about epilepsy by relating, if possible, the change in molecular configuration to the type of attack.

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PSYCHIATRIC SERVICE IN A GENERAL HOSPITAL WITH SPECIAL REFERENCE TO A DAY TREATMENT UNIT¹

A. E. MOLL, M.D.,² MONTREAL, QUE.

Anyone working in a crowded psychiatric outpatient department of a general hospital, whether psychiatrist, social service worker, or nurse, cannot but feel mystified and somewhat perplexed by the ills of the human mind existing in the community, cannot but feel misgivings and frustrations, wondering how to mitigate the anxieties, phobias and obsessions, the depressions and various other emotional maladjustments of these unfortunate people sitting on benches in the corridor, patiently waiting for their names to be called out.

Psychotherapy in such a setting proves to be rather difficult and, at its best, it may not be sufficient to alleviate the emotional disturbances of some of these patients, while admission to the psychiatric ward may not always be either indicated or, where indicated, always feasible.

This problem presented a challenge in the organization of a psychiatric department at the Montreal General Hospital, and demanded a realistic solution. The ever-growing need for psychiatric treatment by the community, and the concomitant development of psychotherapeutic procedures, together with the heightened interest in the care of psychiatric patients, eventually led to the establishment of more adequate facilities for diagnosis and treatment, and amongst them the setting up of the Day Treatment Centre, which can best be described as a compromise between an inpatient and an outpatient service. In this new venture we were greatly aided by the experience of the Allan Memorial Institute of Psychiatry, where a day treatment unit has been functioning since the spring of 1946.

The Day Centre at the Montreal General Hospital opened its doors in October, 1950,

largely through the financial assistance of the Dominion-Provincial Health Grant and the cooperation of the parent hospital. At this Centre the majority of patients report at 8.30 a.m. and return home at 4.30 p.m. daily, except Saturday, when the Centre is open only from 8.30 a.m. to 1.00 p.m., and no treatment is given on Sunday.

On the main floor are reception facilities and offices for the psychiatric social service worker, the psychologist, and psychiatrists, in the order given. Much thought was given to the planning and much time spent in an endeavor to do away, insofar as possible, with the cold and sterile atmosphere traditional of hospitals, sterile in the purity of white walls as well as in the affectivity toward the patient. Much has been said and published about transference relationship between patient and therapist but not enough, perhaps, has been said about the unconscious displacement of emotions, thoughts, and feelings that occurs at all times between people outside any therapeutic relationship. It has often been stated that treatment begins the moment the patient and the psychiatrist meet, the moment these 2 people establish a relationship for the purpose of determining the patient's difficulties and the need to alleviate them. Perhaps it would not be unsound to suggest that treatment begins the moment the patient enters the doors of a psychiatric unit, provided the entire personnel is so equipped in its motivation as to offer a sympathetic approach. This entails the principle of respect for the patient, and the full acceptance of the tenet that there is very little difference between most patients seeking relief from their emotional conflicts and individuals whose constitution and childhood environmental factors, together with favorable conditions of life, have enabled them to develop a less faulty adaptation.

It is for the above reasons that, in the planning of the day treatment unit, careful consideration should be given to the choice of staff and to the provision of a comforting physical setting. The patient is directed by

¹ Read in the Section on Private Practice of Psychiatry at the 108th annual meeting of The American Psychiatric Association, Atlantic City, N. J., May 12-16, 1952.

² Chairman and Director, Department of Psychiatry, Montreal General Hospital; Associate Professor, McGill University.

the receptionist either to one of the offices on the administrative floor for interview by the psychiatrist, psychologist, social service worker or, in the case of patients admitted for physical methods of treatment, to the second floor.

The second floor is the treatment unit, with beds for both men and women in separate small wards, shower and locker rooms, dining room, etc. The beds are occupied in the morning by the patients undergoing subcoma insulin therapy and in the afternoon by the patients treated with electroshock. The dining room is arranged with tables for 4, and is common to both sexes, the primary aim being to stimulate interpersonal relationships. The nurse in charge of the insulin treatment supervises the luncheon arrangements, and by her presence carries through the maternal giving from the insulin ward to the dining room.

After lunch the patients take part in occupational therapy. Great emphasis has been placed on fostering group dynamics and on encouraging the formation of a unit. All the patients receive individual psychotherapy by one of the members of the psychiatric staff, which consists of a director, 3 part-time psychiatrists, a resident who shares his duties with the psychiatric inpatient ward, one assistant resident, and one junior interne, both of them full time. Group psychotherapy takes place twice a week and is carried largely along nondirective principles.

Not all patients treated at the Centre require insulin or electroshock therapy. The type of treatment is necessarily determined by the specific needs of each case; hence there are numerous patients who attend the clinic for individual psychotherapy alone or for both individual and group psychotherapy, or for psychotherapy and occupational therapy. Where needed, chemotherapy and other physical methods of treatment are used, such as narcoanalysis and narcosynthesis, nitrous oxide therapy, etc. Likewise the approach used in individual psychotherapy varies according to the needs of the patient, from the simple directive and suggestive approach to the strictly analytical one.

During the year 1951, a total of 380 patients were treated at the Centre, with 1,630 subcoma insulin therapies, 655 electroshock

treatments, and 65 group psychotherapeutic sessions. The total number of individual psychotherapeutic sessions could not be exactly determined but approximated over 2,500 hours. There were over 500 attendances at occupational therapy.

Practically all types of patients can be treated at the Day Centre, with the only qualification that they be not suffering from an acute psychotic condition necessitating constant supervision of a restrictive nature, as a Day Centre unit is not equipped to take care of patients requiring locked doors and barred windows; furthermore, the treatment terminates at 4.30 p.m. when the patients return home, either on their own or accompanied by members of their family or friends who call for them. Psychoses such as endogenous depression, involutional melancholia, etc., can be treated in a Day Centre; likewise the various psychoneuroses, such as anxiety state, the hysterias, obsessive-compulsive neurosis, and reactive depression. Some of the character neuroses or psychopathies have also been treated, but only after careful study of the case, with attention focused upon their behavior being sufficiently adaptable to allow group participation. Mental defectives are not suitable for treatment in a Day Centre.

The sources of referral of patients are manifold, the most common one being the psychiatric outpatient department, the outpatient departments of the various other services in the hospital, the general practitioners and psychiatrists practicing in the city or outside the city, and finally doctors employed in industrial medicine.

The advantages of a day treatment psychiatric unit may be briefly summarized, as follows:

1. A psychiatric day treatment unit permits the treatment of patients suffering from mental ills at a fairly reasonable cost. Overhead expenses are reduced by one-third; *e.g.*, there is only one shift of personnel and nursing staff, instead of the 3 shifts usually required for the treatment of 24-hour inpatients. The low cost allows the treatment of patients who otherwise would not be able to afford it and who heretofore either had to carry on without treatment or whose treatment had to be restricted to the weekly or bi-weekly attendance at the outpatient clinic.

The low cost is also of much concern to general hospitals, particularly today, overburdened as they are by ever-increasing financial difficulties.

2. Hospitalization is limited to 8 hours daily, and this in itself allows the treatment of numerous patients who, because of their other responsibilities, would not otherwise accept admission to hospital. For instance, mothers and wives who cannot leave their homes, except for limited periods of time.

3. Admission to the Day Centre proves advantageous in the case of patients whose recovery is enhanced by the absence from stress-producing home situations, even if only for part of the day, in the case of patients in the over-fifty age group whose various anxieties can be alleviated by treatment in a comfortable setting and in the case of patients requiring a short period of observation, prior to deciding type of treatment or form of disposal.

4. The excessive dependence upon hospital care not infrequently encountered in patients admitted to a psychiatric ward is counteracted by the patient retaining contact with his family for at least two-thirds of the 24 hours.

5. The rehabilitation of some of the patients previously treated in a psychiatric ward can be facilitated by having such patients carry on with treatment at the Day Centre, sort of a "weaning process," which quite often appears to be very constructive.

6. Day treatment care allows earlier discharge of inpatients, since they can be carried on psychotherapeutically at the Day Centre.

7. Patients advised to accept treatment in a Day Centre react with less anxiety than if recommended for admission to a ward.

The advantages of a day treatment unit enumerated above do not preclude the need for psychiatric wards in a general hospital. Indeed, one is complementary to the other. There are obviously some psychiatric disabilities that are better treated in a psychiatric ward—furthermore, the availability of day treatment facilities does not appear to reduce the number of patients requiring admission to hospital. On the contrary, the better the facilities the greater the number of patients seen and the larger the admission rate to the psychiatric ward. Benefit accrues to the community at large, since there is nothing more distressing or more disrupting to the home economy than an untreated member suffering from a neurosis or a psychosis.

A treatment clinic of this sort is only as good as the personnel that serves it. Painted walls, lavish furnishings, and modern equipment will not make a clinic, unless the personnel is well trained and well motivated in giving to the community the best it has. Teamwork is the key word and teamwork entails a constantly integrated whole, with each member sharing his or her experience with the rest of the staff.

PSYCHIATRIC PROGRESS IN CALIFORNIA

GEORGE N. THOMPSON, M.D., LOS ANGELES, CALIF.

Fifteen years have passed since The American Psychiatric Association held its annual convention meeting in California. The 1938 meeting in San Francisco was an important occasion for the West in general and for California in particular. With the tremendous postwar shift of population to the West Coast it is probably safe to say that it will not be another 15 years before the Association will return, following its 1953 meeting in Los Angeles.

In the March 1938 issue of the *AMERICAN JOURNAL OF PSYCHIATRY*, Dr. Margaret H. Smyth published a comprehensive survey of "Psychiatric History and Development in California," which does not need repeating here. For the information of our guests at the 1953 meeting, however, some of these historical data may be summarized.

The first state hospital in California, opened in Stockton in 1851, received all types of patients, including the "insane." In 1853 it became a hospital solely for the treatment of mental disease. By 1897 there were 5 state facilities for the mentally ill and defective. Each institution had its board of managers of 5 citizens appointed by the governor; and each board, with the hospital superintendent, ran its hospital as it thought best.

It soon became evident that uniform state supervision of these facilities was desirable; therefore in 1897 the legislature created the State Commission in Lunacy. The following is a quotation from the first report of the new Commission made in 1898(4):

In April, 1897, a uniform law for all State asylums was put into operation. Asylums became State hospitals, and the Lunacy Commission was given a confirmatory power over the actions of the State hospital management. The purpose of the new lunacy law and its active agent, the Commission, is good, and its results are bound to be beneficial when Hospitals and Commission work with that harmonious unanimity of purpose which should be the aim of all bodies engaged in charitable work at the expense of the State.

Even after the State Commission in Lunacy was created, the Board of Managers of each state hospital continued to have certain

administrative duties such as "general control and direction of the property and concerns of the institution for which it is appointed," the enforcement of rules and regulations, the maintenance of "an effective inspection of the hospital," and the keeping of various records and reports. The Statutes of 1903 limited their powers and duties by providing that no money might be expended for building or for unusual repairs or improvements unless the plans and specifications were first approved by the Commission in Lunacy. This was intended to safeguard the public interest through centralized supervision.

In 1921 the Lunacy Commission was expanded into a Department of Institutions. The new state department had the additional responsibilities of youth reformatories and facilities for the blind. The Department of Institutions represented a much more highly centralized kind of supervision and management of the state institutions. The statute of 1921 provided that the individual institution's board of directors, managers, and trustees should be "continued in force and constituted advisory boards to the Department of Institutions."

In 1875 the Napa Asylum was opened, then the Agnews Asylum and then progressively other institutions until by 1938 the State Department of Institutions consisted of 14 institutions: (1) Agnews State Hospital, (2) Camarillo State Hospital, (3) Industrial Home for the Adult Blind, (4) Mendocino State Hospital, (5) Napa State Hospital, (6) Norwalk State Hospital, (7) Pacific Colony (for mental deficiency and epilepsy), (8) Patton State Hospital, (9) Sonoma State Home (for mental deficiency and epilepsy), (10) Stockton State Hospital, (11) Whittier State School (for juvenile delinquents—boys), (12) Preston School of Industry (for juvenile delinquents—older boys), (13) Ventura School for Girls (for juvenile delinquents—girls), and (14) California Bureau of Juvenile Research.

By 1938 there were 26,055 patients in

state hospitals, with an excess population of 5,888. By the end of 1952 this number had increased to 51,985, or essentially double the number of patients in 1938. This reflects the increase in population of the state during this period.

Between 1938 and 1952 the following institutions were added to the state system: (1) DeWitt State Hospital, (2) Modesto State Hospital, (3) The Langley Porter Clinic, and (4) Porterville State Home (for mental deficiency and epilepsy).

In addition, following World War II a group of mental hygiene clinics were established. These are located at Berkeley, Fresno, Los Angeles, Chico-Marysville-Redding, Riverside, Sacramento, and San Diego.

In 1945 another step was taken to improve state administration when the Department of Institutions was replaced by the present State Department of Mental Hygiene. The Legislature removed to other agencies all the state institutions except those having to do with mental illness and mental deficiency and gave the Department of Mental Hygiene responsibility for its hospital, clinic, and community services program.

One of the most important and progressive steps in the history of the State Department of Mental Hygiene took place with the development of the Langley Porter Clinic in San Francisco. Before the opening of this hospital the state institutions had been devoted primarily to the care and custody of patients. Any research or training programs were incidental to the patient-care program and were not aided by direct grants from the state. With the increasing recognition that the care and treatment of patients was not decreasing the incidence of mental illness, the Legislature was prevailed upon to allocate funds for the development of a research and training center. Two such institutions were planned, one for northern California—the Langley Porter Clinic—and one projected and still in the planning stage for southern California. The Langley Porter Clinic, a 100-bed hospital in San Francisco, is a division of the University of California Medical School as well as a part of the State Department of Mental Hygiene. It is the only state-supported facility designed primarily for research into the causes and meth-

ods of treatment of mental disease. As such it is the most progressive step in the attempt to solve mental health problems that California has taken in a century. Already the results of its research have begun to bear fruit, although it has not decreased the cases of mental disease and our number-one health problem remains at peak incidence. Scientific research will prevail but time is needed.

Under California law there exists a unique system of handling patients with mental illness. The principal California laws concerned with the management and treatment of patients with mental disorders who are provided for by public funds are contained in the Welfare and Institutions Code. One provision of this code is that the Superior Court of each county may establish a Mental Health Division of the Court. Until recently this division was known as the Psychopathic Probation Department. Originally this Department was intended for the care and supervision of the so-called "chronic, harmless insane." These were, primarily, those suffering from senile mental disorders who were to be cared for at county expense and the law was intended to prevent their commitment to state hospitals. Now, however, the law permits the county to enter into the treatment of all types of patients with mental disorders and to pay for their care in private sanatoria. While the law providing for this department has not been activated in the rest of the state with the exception of the appointment of one mental health counselor in San Diego County, in Los Angeles County the Department has grown into a large and active organization, with 15 Counselors in Mental Health. At this time these counselors have charge of the supervision and care of 3,837 patients. Most of these (2,148) are under treatment in private sanatoria although the care of these patients is paid for by the County of Los Angeles. The Mental Health Department uses over 50 sanatoria for placement and treatment of patients as ordered by the court. This unique situation has developed because of 2 factors. The first is the large number of aged persons who come to southern California. The second has been the development of the large private sanitarium system where these patients can be placed at county expense. This in effect takes the bur-

den of care of these patients away from the state, in turn imposing a tremendous burden upon the county. And still this mental health problem continues. The report of the Superior Court Mental Health Department states, "The large number of aged requiring placement constitutes a never-ending and as yet unsolved problem. . . . This alarming situation is a reflection of the lack of adequate facilities either public or private, to provide the care our aged citizens require" (8).

A new state hospital planned for Costa Mesa in Orange County will relieve to some extent the overcrowding in state hospitals in southern California. It will not, however, relieve the burden of Los Angeles County, and perhaps this problem will not be solved until the county or the state constructs a large hospital solely for the aged mentally ill.

The mental health facilities of Los Angeles County were improved considerably with the construction of a new psychiatric unit at the Los Angeles County General Hospital. This 250-bed facility was opened in 1951. While it is primarily a disposal unit for the channeling of patients to private sanatoria, state hospitals, and to other agencies, a few patients are retained for short-term treatment. It has been a welcome addition to the mental health facilities of the county, and in addition it has improved the facilities available for the teaching of medical students of the schools of medicine of the University of Southern California, the College of Medical Evangelists, and soon, probably, the University of California at Los Angeles.

Los Angeles County General Hospital is one division of the Department of Charities of the county, and other divisions include Rancho Los Amigos, a hospital for patients with chronic diseases. This hospital, which houses nearly 3,000 of the county's "aged sick and dependent poor," contains a psychiatric unit with beds for 600 patients. The general wards of Rancho Los Amigos contain approximately 1,200 patients who are handicapped principally by age or by amputations, paralysis, and other crippling diseases. Such a group constituted the entire population of this institution during its early years; but about in 1910 a small group of psychopathic patients was placed there under court commitment because of refusal by the state hos-

pitals to accept patients who are described by the State Lunacy Law as cases of "chronic mental unsoundness." This group has now grown to 66, who are provided for in 4 large, well-appointed buildings, each with an enclosed exercise yard containing lawns and shade trees. A printed report of the Rancho states (2):

The care by the County of such psychopathic patients has always been a controversial point. It has been a fact for many years that the state hospitals in the northern part of California have unquestionably accepted this class of patients, in spite of the option granted to the superintendents of such institutions to exclude them and to return them to their home counties for care. . . . It has been the contention of many for years that the State could pay a subsidy for cases of this kind which are forced upon Los Angeles County, as care of the indigent mentally ill is generally admitted to be a state function, and this is the only county which is expending any considerable amount in caring for this class of persons.

Harbor General Hospital is another hospital unit of the Department of Charities of Los Angeles County. Located near Long Beach, it has its own psychiatric unit and maintains an active outpatient clinic for its psychiatric division.

From these facts it can be seen that Los Angeles County is actively engaged in the care and treatment of the mentally ill and that it plays a much more prominent role in carrying out this function than do the other counties of the state.

The Veterans' Administration in the southern California area has expanded its psychiatric facilities tremendously during the past 10 years. The first psychiatric facility of this organization in southern California was the Brentwood Hospital, which was started in West Los Angeles in 1936. At that time it consisted of one group of buildings housing about 400 patients. It grew rapidly so that at the beginning of World War II it was caring for about 1,200 patients. The hospital was evacuated during the war years and then functioned as an army station hospital. When it was reactivated as a Veterans' Administration psychiatric hospital late in 1945 it had about 1,400 patients. It has now grown to a hospital of 2,100 patients.

This hospital has an active psychiatric education program and is now authorized to ac-

cept physicians for 3-year residency training.

Following the war, the Veterans' Administration operated Birmingham General Hospital in the San Fernando Valley. In 1950 this hospital was moved to Long Beach to take over the facilities of the former Long Beach Naval Hospital. An excellent psychiatric program of both treatment and training is carried out at Long Beach Veterans' Hospital. Since the hospital is a general hospital it has all the advantages of a psychiatric service in a general hospital, with excellent consultation services in all medical specialties. There are 2 psychiatric wards consisting of 60 beds. An active outpatient clinic is a part of the psychiatric program. A well-organized psychiatric residency training program is in effect, with a 3-year training program offered. An important phase of the psychiatric training program is its close integration with neurology and with neurological surgery. Training in clinical psychology is offered to qualified psychologists under the psychiatric residency training program. The staff of the Long Beach Veterans' Hospital is well known for its activities in research, and the psychiatric division has contributed considerably to this research program.

In addition to its hospital services, the Veterans' Administration operates a mental hygiene clinic in Los Angeles, and here a large number of outpatients are treated annually. Residents in training at Brentwood and Long Beach Veterans' Hospitals serve a period of training in the mental hygiene clinic.

As psychiatric casualties from World War II and from the Korean War continue to mount, the need for more psychiatric beds in this area has been recognized by the Veterans' Administration. Consequently, a new veterans' psychiatric hospital is being planned for southern California and probably will be located in the San Fernando Valley.

Other organizations have begun to recognize the need for psychiatric services and clinics, and there are now many psychiatric clinics for both children and adults in southern California. The Community-Chest-operated Los Angeles Psychiatric Service is one of these. It has been in operation for over 10 years and has filled a major community need.

A number of the private general hospitals in Los Angeles have established outpatient psychiatric clinics in recent years. With the growing recognition that psychiatry should be practiced as a part of general medicine, and that psychiatric patients should be treated in general hospitals as are other patients, an attempt has been made to introduce psychiatric services into general hospitals. There has been much resistance to this move by hospital administrators, but gradually some of the resistance is being overcome. One of the first such services in California was the establishment of the psychiatric service in the Herrick Memorial Hospital, a general hospital in Berkeley, California, by Dr. A. E. Bennett. In Los Angeles only 2 private general hospitals have seen fit to start such services and these are on a very small scale. St. John's Hospital in Santa Monica and the Queen of the Angels Hospital in Los Angeles proper now have small inpatient psychiatric services. It is hoped that the great value of such services to the community will be recognized and that other hospitals will follow these fine examples.

With the end of World War II and the publicizing of psychiatry and psychiatric services, California cities had, as did most of the large cities of the nation, a great influx of physicians entering private psychiatric practice. A tremendous increase in the number of physicians doing private psychiatric practice occurred in the Los Angeles area. At the end of World War II there were approximately 30 psychiatrists devoting full time to private practice in Los Angeles. Today there are more than 300. Hence there has been a ten-fold increase in the number of psychiatrists in a city that has increased its population during the same period by about one-third. While there were too few before, the saturation point is being reached and some are already seeking the smaller towns where the need is greater.

But with all the difficulties of rapid growth of their ranks, southern California psychiatrists have been active in the cultural and educational development of the profession. The Los Angeles Society of Neurology and Psychiatry, which has been in existence for many years, is the cultural hub of the profession. The Los Angeles Neurological So-

ciety publishes a professional journal, *The Bulletin of the Los Angeles Neurological Society*, which is widely read by members of The American Psychiatric Association. The Los Angeles Psychoanalytic Society and the recently formed Southern California Psychiatric Association add to the professional activities of the area. The members of these and allied organizations join in welcoming to Los Angeles the membership of The American Psychiatric Association and hail the convention meeting to be held in Los Angeles in May as another step in psychiatric progress in California.

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CORRESPONDENCE

THE MEETING IN LOS ANGELES

To Members and Friends of the Association:

On May 4, 5, 6, 7, and 8, 1953, the 109th annual meeting of the American Psychiatric Association will be held in Los Angeles. It will be the second meeting of the Association in California. In addition to the scientific program an interesting array of recreational activities is being prepared and will be presented to you when you register at the Statler Hotel.

Your trip to Southern California will offer many other attractions, however, to you and your family. You will be in a region rich in historical lore, traversed by El Camino Real, trail of the Franciscan Missionaries along which 8 of the 21 missions of California are located; near the "smoky port" of San Pedro in the fabulous man-made Harbor of Los Angeles. This is a land of palms and pines, of citrus fruits and diversified agricultural development, of oil fields and mineral production, and of prodigious industrial growth. It is the only area in North America with a Mediterranean climate with almost no rainfall during late spring and summer and prevailing on-shore breezes to assure comfortable days and nights. This is the country of lovely beaches and magnificent mountains, of fertile coastal plains and inland valleys, and of mysterious deserts.

The metropolitan center of this rich and fascinating empire is Los Angeles with its network of splendid highways and with fast, luxurious transportation facilities by air, rail, and water; with luxurious hotels and famous restaurants and night clubs. There is profusion even in the cultural characteristics in

this area with its universities and colleges, its famous secondary schools, its great telescopes at Mount Wilson and on Palomar Mountain, its libraries and museums, its fine philharmonic orchestra, its light opera season, and its annual presentation of grand opera in concert with the Metropolitan Opera Association of New York. In short, Southern California is a land to visit and to enjoy.

From California it is but 9 hours to the Hawaiian Islands by air or 4½ days by palatial ocean liner. Or you may prefer to visit Sequoia, Yosemite, Glacier, or Yellowstone National Parks, the Redwood Highway, the North Pacific coast, Western Canada, or Alaska while on your trip to the Pacific slope.

Distances in California are great. Most of your side trips beyond Los Angeles will require a day. Adequate transportation is available by bus or air or if preferred by automobile.

Be sure to plan to attend the meeting of the A. P. A. at Los Angeles. Make your travel plans and hotel reservations early. Write at once to the All-Year Club of Southern California, Ltd., 629 South Hill Street, Los Angeles 14, Calif., for descriptive literature and suggestions.

I hope that you have already made plans to attend the meeting here, and to enjoy some of the natural and man-made wonders of Southern California and others to which it is the natural gateway.

JOHN B. DOYLE, M. D.

Chairman of the Subcommittee on
Information, Reception, and
Entertainment

ASSOCIATION REPORTS

SURVEY OF EXTENT AND DISTRIBUTION OF PSYCHIATRIC SKILL AND EXPERIENCE IN THE UNITED STATES AND CANADA ¹

In the course of the investigations of the committee system of The American Psychiatric Association I was assisted by the appointment of the Committee on Committees, of which Dr. Robert Felix was Chairman, and by the grant from the Commonwealth Fund, known as the Committee Project, of \$20,000 for 2 years. Studies of the committees and their functions revealed the fact that the appointments were usually made without knowing all the members of the Association who had had experience in the subject matter of the different committees, and the Chairmen of the Committees themselves usually did not have the advantage of knowing how many or which members of the Association had either experience or skill in the particular subjects that were pertinent to their committee work. The Office of the Medical Director has been frequently requested to furnish information concerning the number of psychiatrists in the United States and Canada who are familiar with the various subdivisions of psychiatry; the number working in hospitals; the number in private practice; those engaged in research, in preventive medicine, in educational psychiatry; and other important subjects. Nothing was known with regard to the names or the number of those who were engaged in major teaching activities, nor the number who were residents in training at any particular time. The subject of military experience has been of considerable interest during and following the last war. Yet no information existed that would enable the planning bodies to make intelligent judgment as to the disposition of medical practitioners as to

whether they should stay on their post or be used for military service.

There were, therefore, many cogent reasons why further information concerning all the members of the Association should be collected. A certain amount of this information was already available in the application blanks for membership, but this soon became out of date. Further information concerning our members was also available in the Biographical Directory, but it was impossible to analyze it or in any way subject it to statistical study.

It seemed wise to consider the idea of placing the information concerning each member on some sort of a punched card system. After careful consideration of the various systems available, and with advice from statisticians familiar with the field, it was decided to use the Keysort type of punched card system to collect this information. The Keysort system is inexpensive and simple, and these cards can be analyzed in the office without expense and by persons who do not need a great amount of training. These considerations were weighed against the advisability of using the IBM punched cards. It was brought out that the simpler system was preferable for many reasons, to organizations of less than 20,000 people, and was commonly used in various groups, including many government bureaus that also used the IBM card for more detailed operations in larger collections of data. The use of the Keysort Punched Card system involves a small initial outlay. The punching can be done by employees in the office; data can be secured at any time in a few minutes in our own office, and there are no expenses incurred when a set of figures has to be drawn from the cards. The only expense is the use of someone's time who is already employed in the office for this purpose.

¹ Special report by the Medical Director read at the 108th annual meeting of The American Psychiatric Association, Atlantic City, N. J., May 12-16, 1952.

It was ascertained from the Commonwealth Fund that the expense of inaugurating such a system of information on our members was accepted as a legitimate part of the Committee on Committees' study, furnishing, as it would to all committees, the names of members of the Association who were interested and had experience in the particular subject matter of the technical committees.

Consequently beginning about January, 1951, a form was devised with the advice of

American Medical Association will be placed on the cards of The American Psychiatric Association.

There are 3 major columns. The first is that of Special Experiences, containing 32 items. The second major column is concerned with present activities of a civilian nature. Here are listed the major and minor activities of all members at the time of filling out the card, the type of organization involved, and under whose

NAME		YEAR BIRTH		SERIAL NUMBER		LICENSE	
ADDRESS (City & State)		BIRTHPLACE: U.S. CAN.		OTHER (Specify)		NO. YEARS U.S. CAN.	
DEGREES: Bach. _____		CITIZEN: U.S. CAN.		SEX: M F		MARRIED CHILDREN	
PSYCH. RESIDENT TRAIN: 1yr. _____ 2yrs. _____ 3yrs. _____		OTHER PG. (Specify)		MAJOR TR. PLACE			
CERTIFICATION: RCPS(Canada) AM BO. _____ in P. _____ PN _____ N _____		OTHER SPEC. OF MED. (Specify)		ANY APPT APA			
MEMBER: AMA _____ CMA _____ CPA (Pros.) _____ APA _____ FAPA _____		HONOR. (S)		PREF. APA APPT			
LANGUAGES (Besides English): FRENCH: READ _____ SPEAK _____		OTHER: READ (S)		SPOKEN (S)			
SPECIAL EXPERIENCE		PRESENT ACTIVITIES (Civilian)		MILITARY EXPERIENCE & POSITION (U.S. only)			
GENERAL PSYCHIATRY		1 MAJOR (Check 1 or 2) MINOR (Check several)		ARMY 60 NAVY 61 AIR FORCE 62 U.S.P.H.S. 63			
THERAPY - PSYCHOTHERAPY		2 PRIVATE PRACTICE		POSITION			
HYPNOSIS		3 TEACHING (Med. School) PROF. RANK		34 INDUCTION CENTER PSYCH.			
NARCO-ANALYSIS		4 TEACHING (Med. School) OTHER RANK		35 PSYCH. WARD OFFICER			
GROUP THERAPY		5 TEACHING (Rel. Profession)		36 TRAINING CENTER - PSYCH. SERVICE			
SHOCK THERAPY		6 RESEARCH		37 DISCIPLINARY BARRACKS			
REHABILITATION		7 ADMIN. CHIEF OR ASST.		38 DIVISION PSYCHIATRIST			
OTHER (Specify)		8 CLIN. DIRECTOR OR EQUIVALENT		39 THEATRE PSYCHIATRIST			
CHILD		9 CHIEF N.P. SERVICE		40 NUM. ARMY - AIR FORCE PSYCH.			
PSYCHOANALYSIS in Training		10 WARD OR CLINIC PSYCH.		41 S.G. OFFICE OR EQUIVALENT			
PSYCHOANALYSIS Compl. Tr. Practice		11 EXAMINER-INDUCT. CENTER PSYCH.		42 CHIEF N-P SERV. GEN. HOSP. OR SHIP			
INDUSTRIAL		12 ATTENDING - VISITING		43 REHAB - CONVALESC. CENTER			
FORENSIC		13 RESIDENT IN TRAINING		44 DETACHED TO VA - DVA			
ADMINISTRATION		14 CONSULTANT (Nat'l) (S)		45 DETACHED TO OTHER ORGANIZATION			
TEACHING (Medical Stu.)		15 CONSULTANT (Other) (S)		46 (Specify)			
TEACHING (Related Prof.)		16 OTHER (S)		74			
RESEARCH (Published) LABORATORY		17 TYPE OF ORGANIZATION - Name		RANK			
RESEARCH (Published) CLINICAL		18 ADMIN. HDQ. Fed St Pr. Cty.		47 PRESENT MILITARY STATUS Active duty _____			
MENTAL DEFICIENCY		19 MEDICAL SCHOOL		48 ARMY-AF-P.H.S. NAVY			
NEUROLOGY (Clinical)		20 PSYCHIATRIC HOSPITAL		49 REGULAR TS REGULAR TS			
NEUROLOGY (Basic Sci) (S)		21 GENERAL HOSPITAL		50 RESERVE TS ORGAN RESERVE 80			
EDUCATIONAL PSYCHIATRY		22 SCHOOL FOR MENTAL DEFIC.		51 A. U. S. 77 VOL. RESERVE 81			
PREVENTIVE - PUBLIC HEALTH		23 OUTPATIENT CLINIC		52 NATIONAL GUARD 78			
MEMBER EEG SOCIETY		24 HEALTH DEPARTMENT		53 DOCTOR DRAFT PRIORITY:			
PROJECTIVE TESTING		25 NON-MEDICAL		54 I - 82 II - 83 III - 84 IV - 85 NOT 86			
ALCOHOLISM		26 OTHER		55 Do you draw Ret'd or Disability Pay (Fed.) _____ 87			
PUBLIC RELATIONS		27 CONTROLLED BY - Name		SIGNATURE _____ DATE _____			
RECREATION AGENCIES		28 PRIVATE		AMERICAN PSYCHIATRIC ASSOCIATION			
COMMUNITY AGENCIES & PLANNING		29 FEDERAL					
CIVIL DEFENSE		30 STATE PROV. CITY					
PANIC AND MORALE		31 COMMUNITY					
OTHER (Specify)		32 OTHER					

FIG. 1.—Form used for survey of extent and distribution of psychiatric skills and experiences.

authorities in the APA, the Chairmen of Committees, and statistical experts who gave us the benefit of their experience.

Fig. 1 shows the form that was used. It will be noted that there are certain general considerations in the top of the form. Most of the information available from the punched cards of the American Medical Association was not placed on this card since the number of items was limited, and by the serial number on the top line a cross study could be made of the cards in the APA and the cards in the American Medical Association. The serial number assigned to each person by the

control. The third column gives a history of military experience and position. Information concerning this on our members from Canada was not requested for obvious reasons.

A section on present military status provided the information as to how many of our members are in the Reserve Corps of the Army, Air Force, Public Health Service or Navy; how many are in the regular services, and how many are now on active duty.

The collection of data on these cards has shown several things: the number of cards returned has not been spectacular. A total

of approximately three-quarters of the estimated number of psychiatrists in this country have so far returned their cards. The distribution of this return seems to be about even throughout the country. Consequently a correction of figure has been made so that the analysis is on the basis of 7,444 total psychiatrists, most of whom belong in The American Psychiatric Association, but a certain number furnished by the Canadian

tion in the first 2 or 3 years of their training. A large number of older men have joined the Association in the last 2 years, indicating a new interest in Association activities that they have not had in the past.

Because of space limitations, it is not possible to present an analysis of the psychiatrists of each of the states. We have, therefore, divided the whole country, including Canada, into 6 divisions. These do not vary



FIG. 2.—Distribution of psychiatrists by districts.

Psychiatric Association and the American Medical Association, as having indicated that they were working in full-time psychiatry. The evidence is that 85% of psychiatrists working in the United States and Canada are members of The American Psychiatric Association. This number is increasing rapidly since 25% were not members as recently as 2 years ago. There are always currently a number of younger men in residency training who have either not completed one full year, or who have been slow in joining the Associa-

much from the 6 area divisions of the Veterans Administration. The divisions were an attempt to provide sections that were approximately the same size in order to compare the number of psychiatrists living in these various sections.

Fig. 2 shows the sections I have used arbitrarily as a manner of comparing the distribution of psychiatrists throughout the country. Fig. 3. shows the population in relationship to the number of psychiatrists in the whole of the United States and Canada and

by districts. The northeast section has approximately one psychiatrist for every 10,000 people, and so on. Fig. 4 shows an analysis of the age distribution.

The reaction of someone to whom I showed this chart was immediately, "Why do psychiatrists die so young?" which shows that a chart such as this needs to be explained carefully. Unless I am wrong, the chart actually says that the great majority of living psychiatrists these days are in the younger years, and the great minority are in the older

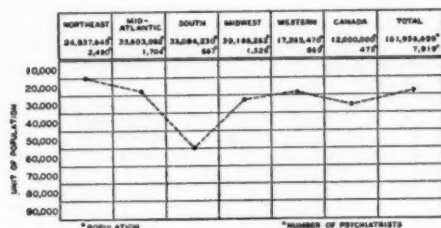


Fig. 3.—Ratio of population to psychiatrists: Whole of U. S. and Canada by districts.

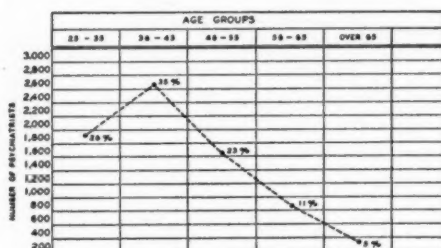


Fig. 4.—Age distribution of psychiatrists: U. S. and Canada.

years. This means that we have more life expectancy in the total number of psychiatrists if the average is somewhere around 45 than if the average was in the older groups of between 55 and 65. As a matter of fact, 61% of the psychiatrists in this country at this time are under 46 years of age. We are a young profession. This obviously emphasizes the large number who have entered psychiatry more lately and the relative few who entered psychiatry in the earlier years of this century.

In regard to the details of these age groupings in the various parts of the United States, a comparison of the percentages indicates that there is very little variation from the average of the entire country in each of the

sections and consequently it seemed unnecessary to present these details.

Table 1 gives the figures on certification by the American Boards. It is of interest that a considerable number of members of The American Psychiatric Association are certified in some other specialty of medical practice, including pediatrics, surgery, gynecology, radiology, eye, ear, nose and throat, and others. We do not have sufficient returns from Canadian members to give us figures on certification in Canada. Some Canadian

TABLE 1

CERTIFICATION: PSYCHIATRY, PSYCHIATRY AND NEUROLOGY, AND NEUROLOGY

	Northeast	Mid-Atlantic	South	Midwest	Western	Canada	Total
Certification	2,490	1,704	667	1,326	869	188	7,444
Psychiatry.....	1,345	774	310	703	406	81	3,000
Psychiatry..... and Neurology.							924
Neurology.....							271
Not certified							3,249

TABLE 2

SPECIAL EXPERIENCES—THERAPY

Psychotherapy	5,270
Hypnosis	920
Narco-analysis	1,628
Group therapy	1,741
Shock therapy	4,038
Rehabilitation	995
Other	381

members are certified by the American Board in the United States.

An investigation of those who have had special experiences is shown in Tables 2-6. The special experiences in psychoanalysis, neurology and EEG were treated separately. In Table 5 the related professions are those of nursing, social work, psychiatric aides, psychology, etc.

Regarding the 1,551 psychiatrists who indicated experience in child psychiatry, I might say that this figure was broken down, and those who also indicated major work in a clinical activity, plus checking child psychiatry, were thought to be those who are the full-time workers in child psychiatry. This number was approximately 250.

With regard to the location of present activities of our members, the returns (Table

TABLE 3

SPECIAL EXPERIENCES—PSYCHOANALYSIS, NEUROLOGY, EEG

	Northeast 2,490	Mid- Atlantic 1,704	Southern 667	Midwest 1,526	Western 869	Canada 188	Total 7,444
Psychoanalysis							
Training	529	314	62	272	145	5	1,327
Practice	488	117	34	124	89	3	855
Neurology							
Clinical	777	481	226	473	249	26	2,232
Basic sciences	265	174	60	138	46	10	693
Member EEG	64	56	34	65	24	8	251

TABLE 4

SPECIAL EXPERIENCES—COMMUNITY

Preventive and public health.....	464
Alcoholism	1,013
Public relations	428
Recreational agencies	121
Community agencies and planning...	1,026
Civil defense	326
Panic and morale.....	148

TABLE 5

SPECIAL EXPERIENCES—EDUCATIONAL

Teaching	
Medical students	3,114
Related professions	2,847
Research (published)	
Laboratory	669
Clinical	1,812
Educational psychiatry	940
Projective testing	280

7) show that 2,925 psychiatrists indicate private practice as their major present activity and 980 others do private practice as a minor activity. Under the heading of teaching, 933 indicate some form of higher ranks in medical schools, including consultants. It is presumed that the figures relating to work in psychiatric hospitals and outpatient clinics probably cover full-time activities in the hospitals and part-time activity in the outpatient clinics.

Table 8 presents figures on the Federal Services. It is impossible to estimate the ratio of psychiatrists to the population involved with regard to armed services since the exact numbers of the armed services is classified information and cannot be revealed.

Table 9 is an example of the type of analysis that can be made of any group of psychiatrists that one would like to select for special study.

There are many other types of information that can be secured from our cards and it

TABLE 6

SPECIAL EXPERIENCES—MISCELLANEOUS

Child	1,551
Industrial	206
Forensic	642
Mental deficiency	601
Other	449

TABLE 7

TYPES OF PSYCHIATRIC PRACTICE:
U. S. AND CANADA

Private practice	3,905
Major	2,925
Minor	980
Resident in training.....	916
Psychiatric hospital	3,020
Outpatient clinic	1,836

TABLE 8

PSYCHIATRISTS—GOVERNMENT AND MILITARY

Federal	
(VA, public health service, armed forces)	1,510
State	2,482
V.A.	805
P.H.	99
Army	350
Navy	185
Air Force	127

TABLE 9

VETERANS ADMINISTRATION—PSYCHIATRISTS
EMPLOYED

Total cards returned.....	788
Certified by board.....	358
Have med. school affiliation.....	225
On duty, psychiatric hospital.....	348
On duty, general hospital.....	213
On duty, outpatient hospital.....	234
Are veterans	428
Had analytic experience.....	158
Experience in neurology.....	224

seems to us that it is quite worth while to have available an analysis of those engaged in psychiatry throughout the United States

and Canada. We expect this to furnish valuable indices as to the way that special needs in various parts of the country are being met; and special information of particular value to the Committees that are working on the various subjects. This gives us the first step toward bringing into the work of the Association all of those in any particular sub-

ject who have had special interest and special experience.

Those who have not yet filled in one of these cards are urgently requested to do so. The card can be filled out in less than 10 minutes. The completed cards should be forwarded to the office of the Medical Director in Washington.

DANIEL BLAIN, M. D.

PRESIDENT'S PAGE

THE ANNUAL MEETING

The annual meeting is the heart of the Association—the heart in sentiment and symbol, and still its major driving force. The outward thrust, the powerful impulse that it imparts to the furthest ramifications of the organization, is matched by the inward surge of reports and papers, petitions, agenda, and memoranda—all seeking the ultimate attention of the membership in session at the annual meeting. To it there come the fruit of night hours in the laboratory, of administrative experience, of clinical work in the hospital, in the studious office, the clinic, and the community.

In the months preceding the annual meeting, applications for recognition of a district branch or affiliate society are readied; proposals to Council are sifted and weighed; committee reports are prepared; budgets are set up. Preparations find their first beginnings immediately after the end of one annual meeting, pick up speed and impetus from the November sessions and from each meeting of the Executive Committee, the standing committees, district branches and affiliate societies, to plunge to their final consummation in the intense activity of the days of the annual meeting.

To different people, the meeting means different things. It lies before the able, younger man an intellectual arena to which he will bring his scientific work and in which he may hope to gain recognition of his talents, friends, and the support they will give him in his coming life work. For many senior members, it is at the annual meeting that important gains in some long-labored-over enterprise may be set up in lasting function or hammered into permanent record: the setting up of a section on psychoanalysis, or the establishment of a committee on international relations, or the authorization of the office of a medical director.

Others have brought to the meeting a blueprint for the development of psychiatry, as did Dr. Ross McC. Chapman in his memorable presidential address in 1938.

On all this, the times and our extraordinary growth exert the fiercest force—force that we can use to grow to greater strength or, failing, suffer futility and ultimate displacement from leadership.

These dangers are actual. Sheer volume of business threatens to obstruct the rapid precision of action of committees and of Council. The setting up of the coordinating committees has been a most valuable step toward assuring efficiency. But, as we grow, there will be a need for a continual series of these administrative inventions.

The Assembly of the district branches—which, it seems probable, will be established this year—will undoubtedly form another channel through which the views, wishes, and proposals of the membership will be brought into Council. Urgent problems are constantly arising—such as, for instance, the difficulty in securing insurance coverage in connection with electroshock. Such problems will find an opportunity of being threshed out in terms of local experience before being sent on to Council.

No less urgent is the need to maintain scientific communication at a high level in our enormously crowded meetings. If the theoretic session draws a thousand listeners, if many of the round tables—set up only 20 years ago by Dr. Samuel Hamilton—are attended by hundreds of listeners (which no round table yet built could accommodate), then how much is taken away by the individual and how much can he possibly learn by individual participation.

In concerned recognition of this, Council has requested the committee on research to consider the feasibility of setting up—possibly with the assistance of the social science research departments of an interested university—a study of scientific communication as it actually occurs at our meetings.

If the crowding numbers of those who attend the annual meeting make us sharply aware of the need to strengthen communication, we must also recognize that a still larger

number cannot attend the meeting at all because of pressure of work, of time and distance, and of cost.

Under a recent Council policy, we are now locating the annual meeting on a 2-2-1 basis. In any 5-year period, 2 meetings will be held in the east, 2 in the mid-west, and 1 in the far west. How far this schedule can be maintained, with the Association already requiring a guarantee of 2,000 bedrooms to accommodate the annual meeting, is problematical.

Currently there is before Council a proposal that, in addition to the annual meeting, large divisional meetings—organized possibly by the district branches or affiliate societies in their respective areas—might be set up annually. One might visualize, for instance, a west-coast division, and a northeast division running from New York, through Boston to Montreal, and another division taking in the territory of the triangle represented by Chicago, Detroit, and Toronto.

These are some of the more massive problems confronting us as we seek to maintain

the importance and the effectiveness of the annual meeting. A great multitude of other matters of a more limited and perhaps more technical nature are brought sharply before us each year as we review the happenings of the annual meeting: How may more members participate, with more satisfaction, at the banquet? Will the television project, which is to be tried out for the first time this year, be successful? Should a more extensive social program be planned?

All those who are ultimately responsible for the annual meeting—the chairman of the program committee, the chairman of the committee on arrangements, Mr. Austin Davies, the Medical Director, and the officers of the Association—request your thoughts, your advice, your practical help, to the end that this meeting, so great with the history of the words and acts of striving men resolute upon the future, so strong in the sentiment of past gains and forward hopes, may be increased in dignity and in power commensurate to these times.

D. EWEN CAMERON, M. D.

EDUCATION FOR PUBLIC OFFICE

We require certain qualifications in lawyers, physicians and clergymen, before we commit our property, our lives or our souls to their care. We even refuse to commit the charge of a ship to a pilot who cannot produce a certificate of his education and knowledge in his business. Why then should we commit our country, which includes liberty, property, life, wives and children, to men who cannot produce vouchers of their qualifications for the important trust? We are restrained from injuring ourselves by employing quacks in law; why should we not be restrained in like manner, by law, from employing quacks in government?

BENJAMIN RUSH

(Urging the establishment of a federal university for the compulsory training of candidates aspiring to a public office. 1788.)

COMMENT

THE WORK OF THE COMMITTEE ON CLINICAL PSYCHOLOGY

In the past several years the Committee on Clinical Psychology has had as the focus of its attention the relations of psychology and psychiatry. A chief item on the agenda has been the question of the independent practice of psychotherapy by psychologists. Attention to this problem has been dictated by the introduction of bills into the legislatures of about 20 states for either the licensure or the certification of psychologists. Some of these bills seemed to state or imply that the intent was to give legal status to the independent practice of psychotherapy by psychologists. In its discussions the committee has gradually clarified its position concerning the legal status of psychologists by favoring certification and disapproving licensure. This position has been accepted by Council and is the official position of The American Psychiatric Association. Certification has been favored because it affords recognition and status to ethical and adequately trained psychologists who wish to function as *psychologists*. Certification is essentially a recognition of the proficiency and is a term attached to a title. Licensure has been disapproved because it usually grants an independent and sometimes exclusive right to do certain things that, in the opinion of the committee, cannot properly be separated from the practice of medicine. Among these things some of the proposed bills sometimes used such words as psychotherapy, re-education, or readjustment in a manner to imply that a licensed psychologist would have the right to practice psychiatry.

The committee has taken the position that psychotherapy is a province of medicine. This has also been approved by Council. In adopting this position, the committee has not believed that it has stated a new principle, but rather that it was reaffirming an attitude recognized since time immemorial that, in the treatment of the sick, psychotherapy is an essential part of the physician's armamentarium. This principle is currently written into or implied in the Medical Practice Acts

of many states as an integral part of the healing art.

The committee hopes that its activities to date have met with the approval of the membership of The American Psychiatric Association. To judge this better, letters were sent to all the district and branch societies, requesting that the last statement of the committee (Newsletter, November 1952) be placed on the agenda of the societies at the next meeting. At this writing, about half of the societies have answered. The replies indicate almost unanimous agreement with the committee's statement.

Fundamental to the position of the committee is the concept that the central and unique job of medicine is the care and treatment of the sick. The causes of illness are many and complex; diagnosis and differential diagnosis are often difficult and frequently remain a continuing problem throughout treatment; therapies are techniques that are grounded rationally upon basic sciences or are founded empirically upon good medical practice. Treatment may employ advice, reassurance, guidance, psychological support or uncovering of emotional conflicts, development of insight, the use of drugs or surgery, electrotherapy, continued hospital care, environmental manipulation, and so on. Psychotherapy, *per se*, whenever sick people are involved always retains its medical orientation. Any person who is given responsibility for the treatment of the sick must have at his disposal the necessary judgment and skills for diagnosis and for decisions as to the particular treatment techniques that should be employed. Individuals from other professional groups may become highly skilled in some aspects of psychotherapy, but this does not entitle them to undertake broad responsibility for the treatment of the sick. Such persons should work in close and continuing association with physicians and, in the case of the mentally ill, with psychiatrists.

Unfortunately, the relations of psychiatry and psychology have been confused and blurred by current concern about the legal status of psychologists and the question of the independent practice of psychotherapy. In this confusion the many fine and productive local relationships that now exist and the important work ahead are sometimes forgotten. Clinical psychologists have made and are making significant and welcome contributions in research in diagnostic methods and are assisting with some aspects of treatment. Research in psychiatry is a crying need. State hospitals, Veterans Administration hospitals, and mental hygiene clinics need more ade-

quate staffing. There is also a great need for more psychiatrists in private practice. The committee believes that the enormous public need for psychiatric services constitutes a challenge and a professional obligation to encourage the constructive use of all available trained persons to meet the vast problem of mental illness. The committee hopes that its work in the near future will be more concerned with efforts to clarify the role of the psychologist in the current psychiatric scene so that there may be a better joining of forces in our attack on problems of mental illness.

PAUL E. HUSTON, M. D., *Chairman,*
Committee on Clinical Psychology.

PSYCHIATRY AND SOCIOLOGY AS RELATED APPROACHES

As body and soul, psychic and somatic, individual behavior and social events are contrasted aspects of related phenomena, so may psychiatry and sociology relate to each other as complementary approaches to a clearer understanding of both personality and society. Though disparate in their focus, their techniques, and perspective, their common source in human behavior could make cognate disciplines of these two approaches. Sociology borrows much from psychiatry in its descriptions of both abnormal and normal behavior. Psychiatric designations for symptoms and categories of mental disorder are applied to social deviants in free and, I fear, careless fashion that frequently translates these designations into specific diagnostic entities. Psychoanalytic interpretations are frequently conjoined with findings from cultural anthropology to produce questionable but pervasive cultural conditioning doctrines that reduce human behavior into a plastic and passive product molded by processes over which the individual has no control, little awareness, and no positive responsibility. Currently the intercourse between psychiatry and sociology is characterized by a flow of psychiatric, particularly dynamic psychiatric, dicta that color the concepts and influence the currents of sociological thought. In this essay, however, I should like in brief outline to indicate three sociological areas from which psychiatrists might glean some insights and from which some small measure of alteration of perspective might be obtained. Most

clearly defined of these areas is a stock of *contemporary factual* data; more complex and subtle is the area of *particularized conceptual* viewpoints; most challenging (albeit most speculative) is the virtually boundless area of the *generalized hypothetical*.

Contemporary factual data from sociology may serve either general or specific interests of psychiatrists. Changes in the age composition of the population are almost certain to affect the nature as well as the extent of psychiatric services, while the rates of marriages, births, divorces, and internal migration, together with differentials in these phenomena when one group is compared with another, provide some descriptive background for social conditions. Factual information about criminality and sexual behavior is of general interest. Of presumed specific interest would be the variations in rates of mental disorders according to socio-economic factors associated with the ecological patterning of cities, as revealed by Faris and Dunham.

Contemporary factual data of such nature are of some descriptive value, provided the reader be aware that ecological correlations are of questionable scientific validity, that other contemporary factual data establish no adequate theory to explain either the general condition or the individual behavior, and that the contemporary condition cannot be projected into the future—much less serve as a basis for general prediction or individual prognosis.

Cultural conditioning dogma that squeezes personality into a simple mold fashioned by an undefined, amorphous, but presumably omnipotent culture can be viewed askance by psychiatrists who yet consider the possible value of particularized concepts that appear in sociology and social psychology. Broad in scope but influencing segments of behavior rather than determining patterns of behavior are concepts relating to class and group membership. Illustrative of particularized concepts is that of *marginal men*, first identified by Robert E. Park, later developed by Everett V. Stonequist to apply to those members of minority groups who live between two cultures. Differences in attitudes and opinions associated with race, sex, economic status, education, and class as measured by surveys may shed light on behavioral differences, may even seem to enable prediction of behavior on the basis of group membership, but, since most such findings lack foundation in tested psychological theory, are of limited diagnostic or prognostic value.

A refreshing and perhaps promising change in perspective can be derived from thinking of behavior as influenced by the situational matrix. Constituting a departure from behavior viewed in terms of specific goal-directed drives, and less doctrinaire than oversimple cultural determinism, the situational approach has its genesis in gestalt psychology. Kurt Lewin, among others, has explored some of the ramifications of this approach; Solomon E. Asch has incisively delineated this perspective in his recent *Social Psychology*; while J. H. S. Bossard has focused individual and familial factors into the situational approach in *Ritual in Family Living* and other works.

Generalized hypothetical interpretations of personal maladjustment are implied in the concept of *cultural lag*, flowing from an assumption that the lag of customs and values behind technological development strains personal adjustment as well as social organization. Karen Horney, in various works, played variations on this theme, while Law-

rence K. Frank exhausted the possibilities of lags and value-conflicts as producers of personal maladjustment in *Society as the Patient*.

For possible consideration I should like to sketch an outline of what seems to be the factual obverse of the assumption that rigid and repressive codes inhibit and distort personality, that cultural lags and value-conflicts produce emotional disorders. Factually criminality, juvenile delinquency, corrupt practices by governmental officials, sports "fixes," divorce, and violations of codes of sexual conduct mount in magnitude. These violations of mores find supplement in relaxation of folkways relating to dress, speech, and general behavior. In manners and in mores we have such latitude as would astound our progenitors. Quantitative indices of this "cultural spurt" can be coupled with personal observation, and with the reflection of current behavior found in literature. Another clue is to ask yourself the question: "What now remains in the mores to arouse my immediate and unquestioning moral indignation?"

Perhaps our euphemistic designations "rationality," "permissiveness," "expression of personality needs," and moral "tolerance" are more properly indicative of moral apathy, of an anemic amorality lacking both positive conviction and robust challenge to convention. As the acids of rationalism dissolve conventional boundaries for behavior, temptation and opportunity conspire to encourage excursions into vaguely defined moral areas. Precepts indoctrinated into their youth restrain older persons in such adventures, while innate balance checks those endowed with a stable disposition. Younger persons, and those heretofore restrained only by the pressures of convention now, lacking clear and firm guideposts, drift, and in such drifting many pass emotional or social points of no return, become deviants in a norm-impooverished age of *anomie*.

A. H. HOBBS, PH.D.

University of Pennsylvania.

THE NATIONAL ASSOCIATION FOR MENTAL HEALTH

A major nation-wide campaign to bring the services of the National Association for Mental Health more widely before the public and to raise funds for the continuance and expansion of its work is now under way and will be especially active during Mental Health Week, May 3-9, 1953. Sponsored by the Association, last year's Mental Health Week brought into actual participation more than 5,000 national, state, and local organizations.

It will be recalled that the National Association for Mental Health is the successor of the National Committee for Mental Hygiene founded by Clifford Beers in 1909. The be-

neficent services of this organization for nearly half a century in all fields pertaining to mental health are too well known to the readers of this JOURNAL to need comment.

This past year the work of the National Association was supported by generous contributions from foundations, special gift donors, Community Chests and United Funds, and businessmen who gave their gifts through the New York City Commerce and Industry Committee. It is hoped that the Association's appeal will this year meet with no less generous response.

Language is the great instrument of fanaticism. A critic of politics finds himself driven to deprecate the power of words, whilst using them copiously in warning against their influence. It is indeed in politics that their influence is most dangerous, so that one is almost tempted to wish that they did not exist, and that society might be managed silently, by instinct, habit and ocular perception, without this supervening Babel of reports, invectives, laws, arguments and slogans.

SANTAYANA

NEWS AND NOTES

NATIONAL COMMITTEE FOR RESEARCH IN NEUROLOGICAL AND SENSORY DISORDERS.—

This newly formed national body has announced a year-long program to stimulate research in neurological and sensory illnesses in medical schools, teaching hospitals, and health agencies. The field includes epilepsy, multiple sclerosis, cerebral palsy, muscular dystrophy, parkinsonism, blindness, deafness, and other crippling disorders of adults and children. Neurological and sensory disorders are considered the leading cause of chronic disability and the third cause of death. Almost 20 million persons in the United States are affected by these conditions, half this number gravely disabled.

Charter members of the new organization are the National Society for Crippled Children and Adults, the National Multiple Sclerosis Society, the Committee for the Public Understanding of Epilepsy, United Cerebral Palsy, the Muscular Dystrophy Associations, the National Epilepsy League, and the professional neurological societies.

Dr. A. B. Baker, professor of neurology at the University of Minnesota, is chairman of the new committee, and Mrs. Garvin Tankersley, president of the National Epilepsy League, is chairman of the steering committee.

VISIT OF DR. WEBER OF GENEVA.—

Dr. John H. Travis, director, Manhattan State Hospital, Ward's Island, New York City, has announced that Dr. J. A. Weber, Professor Emeritus of Anatomy at the University of Geneva, Switzerland, will visit the United States shortly to spend several months as visiting research scientist at Manhattan State Hospital. Dr. Weber will continue his studies on the synapse, with particular emphasis on its structure in brain biopsies of psychotic patients.

RESEARCH ON MENTAL RETARDATION.—

The National Association for Retarded Children has announced the setting up of a 25-member national board to conduct research

with mentally retarded children. As chairman of the board, Dr. Grover F. Powers, professor emeritus of pediatrics at Yale University, has been appointed. Dr. Powers, a Fellow of the American Academy of Pediatricians, received the Borden Award for his research in infant nutrition in 1947.

THE MAZORRA HOSPITAL IN CUBA.—

Dr. Leo H. Bartemeier has kindly submitted the following information concerning this institution, the official title of which is "Hospital de Dementes de Cuba," and which is the only public mental hospital in the Republic of Cuba. It was founded in 1857 and is distant about 9 miles from downtown Havana. The patient population is approximately 4,000. Of the 92 physicians on the staff only 12 have had some training in psychiatry. The director, Dr. Salas-Humarh, is a presidential appointee. Personnel includes 50 male and 50 female nurses and about 100 male and 100 female student nurses. The hospital includes clinics for epileptics and syphilitics and separate wards for social delinquents and for senile patients.

Only since January 1945 have psychiatrists been added to staff, and only since October 1952 have diagnostic studies been undertaken on 200 recently admitted male patients, by Dr. Julio Reymondez and Dr. Miguel Min, together with 9 assistant physicians. Their studies include physical and psychological examinations and the keeping of careful case records. On the basis of these studies it is determined whether patients will be assigned for electroshock, insulin therapy, or transfer to custodial care. It is expected that group therapy will later be introduced. Dr. Jose Gurri, who has had residency training in Boston and been admitted to the Boston Psychoanalytic Society, will undertake similar studies on newly admitted women patients.

SOUTHERN PSYCHIATRIC ASSOCIATION.—

The 1952 annual meeting of the Southern Psychiatric Association was held in the

Greenbrier Hotel at White Sulphur Springs, West Virginia, November 3 and 4, 1952. The whole program was dedicated as a memorial to the late founder and long-time Secretary-Treasurer, Newdigate Owensby. The memorial address was prepared by a special committee, and given by Dr. Cleve C. Odom.

The scientific session followed for the 2 days. Among the guest speakers were Dr. Gregory Zilboorg, who gave a paper on "The Vitiations of the Will to Get Well," and Dr. George Ham, who spoke on "Psychiatric Education in Medicine."

At the business meeting the following officers were elected: Dr. Willard S. Waldron, Jackson, Miss., president; Dr. John D. Trawick, Louisville, Ky., president-elect; Dr. Dexter M. Bullard, Rockville, Md., and Dr. David C. Wilson, Charlottesville, Va., vice-presidents; Dr. Joseph E. Barrett, Richmond, Va., chairman, board of regents; Dr. Wilmot S. Littlejohn, Birmingham, Ala., and Dr. E. M. Robards, Jackson, La., board of regents; Dr. Joseph L. Knapp, Dallas, Texas, secretary-treasurer.

It was deemed advisable by the Association to appoint a Committee to study the Constitution and By-Laws, and make a report to the Association, with recommendations, at the next meeting. The committee was appointed by the out-going President, Dr. O. S. Hauk, members consisting of Drs. Joseph E. Barrett, Wilmot S. Littlejohn, E. M. Robards, R. Burke Suitt, R. Finley Gayle, Jr., and Dexter M. Bullard.

Plans were made to hold the next meeting in Mississippi, the exact location and time to be decided at a later date.

ALLGEMEINE AERZTLICHE GESELLSCHAFT FUER PSYCHOTHERAPIE.—This Society, originally founded in 1926 in Vienna by Dr. Wladimir G. Eliasberg and later dissolved by Hitler, has recently been reconstituted under the presidency of Dr. Viktor E. Frankl. At the first meeting of the present semester in November 1952, Dr. Eliasberg was elected an honorary member. Before the original society was dissolved 7 congresses had been held, the material relating to which has been retained by Dr. Eliasberg and throws valuable light on the history of psy-

chotherapy during the first half of the 20th century.

GERMAN SOCIETIES OF NEUROLOGY AND PSYCHIATRY.—Two organizations, the German Society of Neurology and the German Society of Neurologists and Psychiatrists, will hold a combined meeting in Munich, August 26-29, 1953. The subject for the first day will be neurosurgery; for the second, meningitis; for the third, the development of psychiatry in the United States during the last 2 or 3 decades. Psychotherapy and psychodiagnostics will be discussed on the last day.

For information write to Dr. Ehrhardt, Universitäts Nervenlinik, Marburg/Lahn, Germany.

DR. MCCARTHY HEADS ALCOHOLISM RESEARCH.—Dr. Raymond G. McCarthy has been appointed director of alcoholism research for the New York State Mental Health Commission. Dr. McCarthy had been executive director of the Yale Plan Clinic since 1944 and had served as educational director of the Connecticut Commission on Alcoholism since 1949.

The Commission's alcoholism program was set in motion last year on Governor Dewey's recommendation with a legislative appropriation of \$100,000 to develop a clinic program for chronic alcoholics, plus an additional \$45,000 for research in this field. An 8-man advisory committee was appointed last autumn to assist the Mental Health Commission in planning this program.

DISSERTATIONS ON EPILEPSY.—The American League Against Epilepsy announces an extension of time limit for submission of dissertations for the Jerry Price Memorial Prizes from April 1 to July 1, 1953. The prizes will be awarded for the best dissertation on any aspect of epilepsy submitted by students of approved medical schools in the United States and Canada. The first prize is \$500, and other prizes to a total of \$1,000 will be awarded. Inquiries may be addressed to any member of the prize committee: Dr. William G. Lennox, 300 Longwood Ave., Boston 15, Mass.; Dr. Francis L. McNaugh-

ton, 3801 University St., Montreal 2, Canada; Dr. John L. Otto, 816 Strand, Galveston, Texas.

LOW COST PSYCHIATRIC CLINIC CARE IN LOS ANGELES COUNTY 1952.—A brochure with this title, constituting Community Report Number 1, is available from the Southern California Society for Mental Hygiene, 3067 West Seventh St., Los Angeles 5, Calif. Facts about psychiatric needs, costs, and services in a community of 4 million people are presented, with the aim of public education. Also included is a program of action to meet the psychiatric clinic needs of Los Angeles County.

DIRECTORY OF PSYCHIATRIC CLINICS IN NEW YORK STATE.—This new directory, compiled by the New York State Mental Health Commission as of October 1, 1952, should prove useful. The information has been conveniently assembled by communities; in each case the clinic hours and staff are described and the names of certain staff members are given. The Directory includes an index of psychiatric services by counties, as well as indexes showing clinics according to sponsorship, whether state-operated or otherwise.

YALE UNIVERSITY SUMMER SCHOOL OF ALCOHOL STUDIES.—The tenth anniversary of the Summer School of Alcohol Studies of the Laboratory of Applied Physiology at Yale will be observed during the 1953 session, which will be held June 28 through July 23. In addition, sessions for two special groups, alumni of the School and industrial personnel, are scheduled for the week of July 27. During the decade the School has been conducted, 1,479 students from 47

states and the District of Columbia, from 9 Canadian provinces and from 14 other countries have attended.

The 1953 Summer School, through a series of lectures and seminars, will offer a systematic investigation of various aspects of the functions and problems of alcohol as they affect the individual and society.

Applications for admission must be submitted by April 15. Write for application blanks to the Summer School of Alcohol Studies, 52 Hillhouse Ave., Yale Station, New Haven, Conn.

WESTERN SOCIETY OF ELECTROENCEPHALOGRAPHY.—This Society will hold its tenth annual meeting in the Statler Hotel, Los Angeles, Calif., on May 9 and 10, 1953. For further information write to the secretary-treasurer, Dr. S. N. Berens, 902 Boren Ave., Seattle 4, Wash.

BLOOD DONORS WANTED.—From the Office of Defense Mobilization, Washington, D.C., comes the following appeal:

Over 60 million Americans can be miracle makers. You may be one of them. Any person from 21 to 59 who is in good health and weighs 110 pounds or more is eligible. The miracle you can perform is saving human life. And it is important that you do it right now. You can render this unique service by giving a little of your blood. In less than an hour you can simply and painlessly donate a pint of your blood to help someone live.

The National Blood Program calls on you to help in this miracle-making business so that no one here at home or fighting in Korea need die for want of this vital substance. You are needed at your local Blood Donor Center now. Call your local Red Cross Chapter to schedule your donation today.

BOOK REVIEWS

SOME COMMON PSYCHOSOMATIC MANIFESTATIONS.

Second Edition. By *J. Barrie Murray, M.A., M.D. (Cantab), M.R.C.P.* (New York: Oxford University Press, 1951. Price: \$3.75.)

The author of this book is an internist or general practitioner. He therefore anticipates that the psychiatrist "may feel some resentment at the encroachment of his particular form of activity by one who obviously is not as well informed as he is." I hasten to state that the book is a significant contribution to medicine, in focusing the attention of the medical man on the role of emotions in physical illness.

In 271 pages of text, Murray discusses effort syndrome, the eye signs of fear and their relation to thyrotoxicosis, psychosomatic manifestations in the skin, psychogenic rheumatism, the low back syndrome and allied states, psychosomatic manifestations in the alimentary tract, miners' nystagmus, and treatment.

In a concise introduction of 6 pages, the author masterfully presents the quintessence of the nature and scope of psychosomatic reactions. These are physical complaints, signs and symptoms that express emotional reactions. For the benefit of the physician but nonpsychiatrist to whom this book is chiefly addressed, the author emphasizes that a correct psychiatric diagnosis is not necessary for the diagnosis and adequate medical handling of psychosomatic manifestations. For, the writer points out, he "is concerned entirely with the physical expression of emotion," irrespective of whether the emotional reactions occur in "normal" people or in various psychosomatic conditions. His method of eliciting the emotional reactions is not to "analyze" but to use the routine medical procedure of history-taking and examinations.

The discussion of each of the above-outlined topics is very comprehensive and illustrated with case histories. The chapter "Miners' Nystagmus" is a study of pertinent information of the medical and psychiatric aspects of this pathological condition. Moreover, it offers a succinct but rich in content description of the miners' socio-economic life, which helps one to understand the psychological implications in this illness.

Throughout the book, the author uses effectively his own experience and bibliographical references to call the attention of the physician to diagnostic errors and unsatisfactory treatment, because he concentrates exclusively on the disease and leaves out of consideration the host of the disease.

I am satisfied that this "needling" comes from a physician-nonpsychiatrist; perhaps it will prove to be more effective.

In a concise discussion of treatment the author formulates sound principles of psychotherapy that can and should be practiced by the general physician.

SOLOMON KATZENELBOGEN, M. D.,
Saint Elizabeths Hospital,
Washington, D. C.

PROGRESS IN NEUROLOGY AND PSYCHIATRY. Edited by *E. A. Spiegel, M.D.* (New York: Grune and Stratton, 1952. Price: \$10.00.)

This seventh volume of the annual and now well-known "Progress in Neurology and Psychiatry" needs no exhaustive review. This is particularly so because the book is essentially a thorough but noncritical review of the literature of the above topics as collected by some 75 senior contributors.

The work is divided into 4 parts, the basic sciences, neurology, neurosurgery, and psychiatry and each of these is divided into chapters. The chapters are each written by a contributing author and each chapter concludes in a full index of author references. The general subject index covers the complete book. This organization results in certain virtues and advantages but imposes considerable problems on the editors and has inherent disadvantages.

The "basic disciplines" include neuro-anatomy, general and regional neurophysiology, neuropharmacology, and neuropathology. It would seem advisable to include psychology and psychopathology in this introductory section. Unless these chapters are as complete as necessary for specialized research workers, which seems unlikely, they might well only attempt to deal with changing concepts, or research trends of interest to the clinician, with critical comments. In all fairness it should be made clear that the contributors have attempted this difficult objective to a degree.

The new chapters on pediatric neurology and genetics are useful and interesting. The biennial reviews of neurosyphilis and the so-called criminal psychopathology appear in this year's volume. The rapidly increasing experience with infections of the nervous system and their treatment with antibiotics are well and fully covered. The same might be said regarding the chapter on psychosurgery but the reviewer is sure that every chapter might have special appeal to one or another reader.

The fourth part of the book dealing with psychiatry is commendable in giving references to contributions concerned with broad questions within this field not readily available elsewhere, while not neglecting the clear and concise subjects such as forensic psychiatry and projective methods. Necessarily brief but timely chapters cover recent developments in psychiatric nursing, occupational therapy, and rehabilitation.

This volume, like its predecessors, will prove a mine of stimulating information to the casual but informed reader and a needed, useful reference work for those active in clinical and research projects. It leaves the reviewer with a feeling of optimism for the wealth of information accumulating and the energy being spent on further searches. This is in contrast to the hopeless sense of being overwhelmed that some of us experience when

we must examine long bibliographies where title and subject only are given.

GEORGE E. REED, M.D.,
Verdun Protestant Hospital,
Montreal, Que.

DIE SKOPOLAMINWIRKUNG: VERGLEICHEND PSYCHOPATHOLOGISCH - ELEKTROENCEPHALOGRAPHISCHE UNTERSUCHUNG. (THE EFFECT OF SCOPOLAMIN: A COMPARATIVE PSYCHOPATHOLOGIC-ENCEPHALOGRAPHIC INVESTIGATION.) By Hans Heimann. (Basel: S. Karger, 1952.)

Dr. Heimann, a member of the staff of the Psychiatric University Clinic Waldau-Bern, has made psychological examinations on subjects who were under scopolamin intoxication while they were constantly electroencephalographed in the EEG laboratory. It was found that there occurs a peculiar disturbance of consciousness affecting the intentional acts. Correlated was a depression of the alpha waves, a paralysis of alpha activity. The author accepts the views of Ostow "that the alpha waves are indeed an expression of the readiness of the brain for optimal function in the broadest sense," and of Gruenthal and Remy who hold that these waves have a "fundamental function for the processes of intentionality and of affective and spontaneous alertness."

This is an interesting and stimulating piece of work. It remains to be seen how far the interpretations are justified.

EUGEN KAHN, M.D.,
Houston, Texas.

WHEN DOCTORS ARE PATIENTS. Edited by Max Pinner, M.D., and Benjamin F. Miller, M.D. (New York: W. W. Norton & Co., 1952. Price: \$3.95.)

There is drama and tragedy in the story of the production of this book and in the contents too. Each of the autobiographical narratives is a chapter in *la comédie humaine*. Thirty-three physicians, including the two editors, tell herein the stories of their illnesses. These illnesses cover a wide range—cardiovascular disease, blindness, deafness, vestibular nerve damage, poliomyelitis, renal calculus, migraine, dengue fever, thrombophlebitis, morphine addiction, chronic alcoholism, multiple sclerosis, cancer, chronic neurosis, typhus fever, acute anxiety state, manic-depressive psychosis, bronchiectasis, sinusitis, weather sensitiveness ("hay fever"), pulmonary tuberculosis, chronic brucellosis, rheumatoid arthritis, hemochromatosis, narcolepsy, gall bladder colic, epilepsy, aging, and other conditions.

Doctors and students will profitably read these stories, for they supplement the descriptions of disease in the textbooks by giving the other side of the picture—how it feels to have the disease. More important still it teaches how with good will the sick man can make the best of his handicap and carry on in spite of his disease.

But it must not be thought that these reports, because they are written by doctors, are either (1) 100% objective, or (2) typical pictures of the personal side of the given diseases. Completely objective autobiography is of course impossible, even for a Rousseau or a Gide. Perhaps Pepys came a little closer to it since, as we are to suppose, he did not expect to be given to the public. One does not need to be a Berkeleyite or a solipsist to realize that all experience, including that of illness, is purely a matter of consciousness or, as one writes about it afterward, of conscious and not infallible memory. What the reader gets is a picture of disease seen through a personality. These pictures are not therefore patterns of the psychological side of given kinds of illness but rather expressions of individual personalities and how they have individually reacted to their disabilities. Illness shows the stuff of which the person is made, and the reports in this book exhibit the widest range of personal reactions, from stoic endurance and courage to somewhat pitiful, perhaps even slightly ludicrous, attitudes.

All the contributors deal in one way or another with two issues posed by the senior editor: (1) How has my personality modified the disease? and (2) How has the disease modified my personality? He did not make an issue of the questionable question: Does my personality predispose to this or that disease? One lesson these histories bring home is that even with a serious and incurable malady, by some little rearrangement of one's life, professional work can be carried on satisfactorily and satisfyingly. Another is that when the doctor requires medical care he wants to be and should be treated as a patient like any other, not as a doctor who is sick.

There have been numerous previous autobiographic reports of diseases of physicians. In 1929 Grotjahn (a contributor to the present volume) published *Aerzte als Patienten*, a book containing 101 such case reports. They largely lack, however, the detailed personal features that give the book under review its significance. As Max Pinner remarks in his preface, this collection presents "impressive evidence that in disease, regardless of its nature, psychogenic symptoms are frequent and may be a greater torment for the patient (and hence a serious challenge to the treating physician) than his obvious 'somatic' symptoms."

The plan for "When Doctors Are Patients" was conceived by Max Pinner while chief of the division of pulmonary diseases at Montefiore Hospital, New York City. There Dr. Benjamin Miller had come to him as a patient. Dr. Pinner, a victim of chronic heart disease, was at length forced to give up hospital work because of the progression of his malady. When he died in 1948 his book was left unfinished. It fell to his friend and former patient, Dr. Miller, to complete it.

C. B. F.

IN MEMORIAM

MAX A. BAHR, M. D.

1874-1953

Dr. Max A. Bahr died rather suddenly on January 24, 1953, from a coronary occlusion in his home in Thorntown, Indiana, where he lived following his retirement 10 months ago as superintendent of Central State Hospital of Indianapolis. He was 78 years old and had served the mentally ill for 54 years at the Indianapolis institution.

Born in Indianapolis, Dr. Bahr was the son of Professor Paul Bahr, composer and pianist who set many of the poems of James Whitcomb Riley to music. Dr. Bahr was graduated in 1896 from the Central College of Physicians and Surgeons, predecessor of the Indiana University School of Medicine. After a residency at the former Government Emergency Hospital in Washington, D. C., he affiliated himself with Central State Hospital on March 1, 1898. He soon decided to make psychiatry his specialty and enlarged his experience by doing postgraduate work abroad. In 1908 he worked with Professor Dr. Ziehen, head of the Psychiatric Clinic of the University of Berlin.

In 1923 Dr. Bahr was advanced to the position of superintendent. Under his leadership the institution soon became nationally prominent and toward the end of his career he found himself at the helm of one of the best known state mental hospitals.

Among Dr. Bahr's many scientific accomplishments, the work on the malaria treatment of general paralysis was probably the best known. As early as 1925 the institution established a service by which physicians throughout the country were able to obtain a certified strain of malaria to carry out this therapy. Through publications and particularly through the medium of scientific exhibits, which were shown at national and state medical meetings, the institution familiarized others with this mode of treatment. In this way many patients were saved from dementia and death.

At the International Symposium on Malaria Treatment held in Breslau, Germany, in 1931, a detailed account was given by the Indianapolis institution on the question of why malaria brought about a cure in general

paralysis. Up to that time only vague ideas had been expressed.

With the advent of penicillin the National Research Council furnished the institution with this antibiotic long before the drug was available for civilian use. In 1949, at the first annual meeting of the American Academy of Neurology, Central State Hospital was able to come out with the statement that penicillin, when given in appropriate amounts, was equal or even superior to the malaria treatment. This marked the end of the malaria therapy.

Another piece of research of enduring value, which was carried out under the leadership of Dr. Bahr, concerned the relationship of rheumatic fever to certain psychotic states. This study brought out the continuity of rheumatic fever in a chronic or subclinical form, which in some individuals endured throughout the lifetime. By neuropathologic studies it was shown that rheumatic vascular changes, associated with gross or microscopic cortical softenings, occurred sometimes decades after the original attack of rheumatic fever, producing various psychiatric and neurologic syndromes, at a time when the individual was otherwise enjoying good physical health. This late sequel of rheumatic fever has been termed rheumatic brain disease and has since been confirmed in this country and abroad. This condition can be successfully treated by a combined cortisone-penicillin therapy.

The institution that Dr. Bahr headed took part repeatedly in national and international meetings, the most recent being the program of the First International Congress of Neuropathology in Rome, Italy, in 1952.

Dr. Bahr, for many years, was chairman of the department of psychiatry and neurology, Indiana University School of Medicine; he was president of the Indianapolis Medical Society, and an auditor of The American Psychiatric Association.

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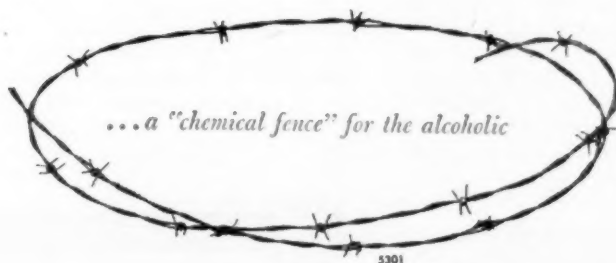
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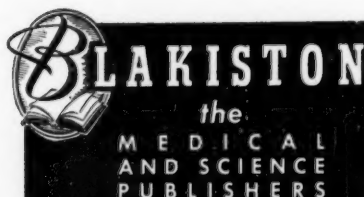
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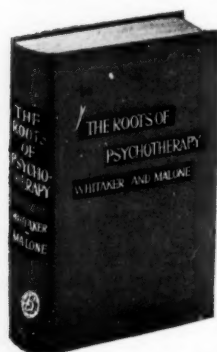


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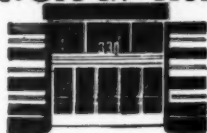
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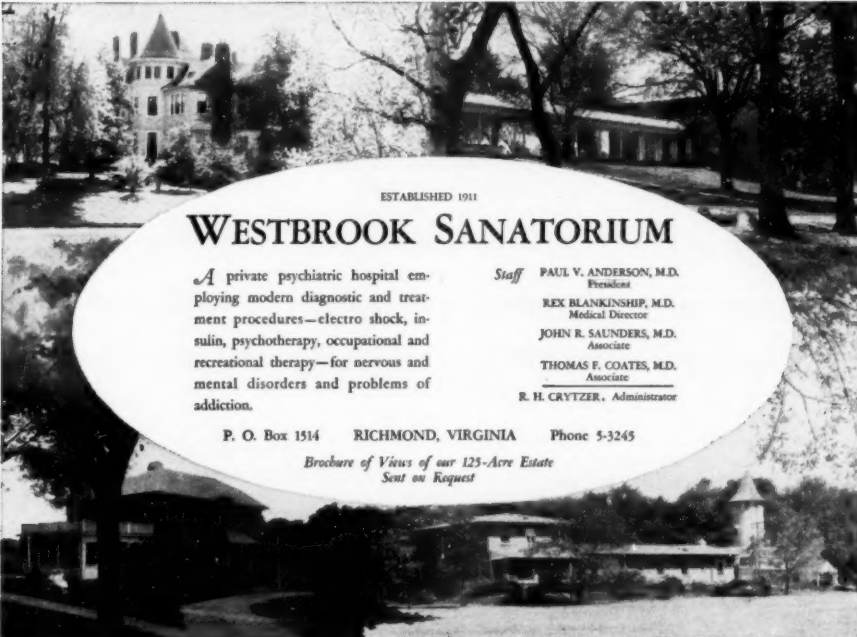
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